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Fresh-Water Algæ. IX.

By FRANCIS WOLLE.

(Plate XLVII.)

The opinion expressed in the preface to my Desmids of the United States, that the field for the study of our fresh-water algæ has not by any means been exhausted, receives confirmation in the additions made during the summer of 1884 to our already respectable collection of new species and varieties. The following list comprises the names and descriptions of nearly fifty species and varieties new to the flora of the United States. They were gathered, some from the apparently inexhaustible ponds of New Jersey, some by the Rev. H. D. Kitchell in Florida, others in the neighborhood of Minneapolis by Miss E. Butler, and a few from ponds of Pennsylvania. The plate which accompanies this article illustrates the species and varieties herewith described, and this, with four others, all of them colored, will form part of an appendix, or of a second volume of my work on the Desmids of the U. S., according to the quantity of material available at the time of publication.

DESMIDIACEÆ.

Hyalotheca dissiliens, var. HIANS, *n. var.*—Cells one-half to as long as wide; closely conjoined, sides more or less arched, with a distinct central notch. Diameter 25–50μ.

The large forms from Budd's Lake, N. J., the small from Maitland and other localities, Florida.

It is very nearly allied to a New Zealand species described by Nordstedt (*H. hians*). Some specimens from Florida present the appearance of undeveloped *Desmidium quadratum* and may be related thereto; the larger New Jersey forms, however, give no evidence of a thickening border or of a twist. End view circular.

Sphærozosma pulchellum, Archer, var. *bambusinoides*, Wittr.

Florida, Minn. and New Jersey ponds.

Penium (*Cylindrocystis*) *tumidum*, F. Gay.—Frequent in Toevi marshes, Florida.

Closterium juncidum, Ralfs, forma *gracillima lævissima*, Bréb.—Frequent in pond near Maitland, Florida.

C. lanceolatum, Kg.—I received last summer hundreds of specimens of this species in a gathering made by Prof. F. W. Cragin, Kansas. Diameter 40–50μ. Length 225–300μ

C. didymotocum, Corda.—A large form and distinct variety corresponding to description by Delponte. Cytioderm not longitudinally striate, but smooth and apices obtusely rounded. Diameter 50–60μ.

Minnesota and New Jersey.

C. ensis, Delp.—Occasionally in Minnesota, Pennsylvania and New Jersey ponds.

C. prelongum (Bréb.) Delp.—Luzerne Co., Penn., and Minnesota.

C. Brebissonii, Delp.—Similar in form to *C. prelongum*, but not striate or recurved at the ends.

Minnesota.

C. subcostatum, Nord.—Florida Ponds.

C. Delpontii, Krebs.—Delponte called this *C. crassum*, a name already applied to a species described by Rabenhorst; it was therefore changed as here given.

Frequent in Luzerne Co., Penn.

C. pronum, Bréb.—Differs from allied forms in its small size and proportionate length of body with the beak.

Florida ponds.

Docidium Archeri, Delp.—Luzerne Co., Penna.

D. rectum, Delp.—According to Delponte this species is separated from *D. Baculum* by being always straight, never bent, without a basal inflation, stouter and longer. I have frequently met with it, but am not yet satisfied that it is different from *D. Baculum*.

D. Woodii (Delp.) Wolle.—Cell cylindrical, six to ten times longer than broad; apices rounded, basal inflation of semi-cell large, wide and high; cytioderm smooth. Diameter at ends, 50μ; inflated base 65μ; length about 600μ.

Ocean Co., New Jersey.

Cosmarium Nordstedtii, Delp. (Plate XLVII. Figs. 23 and 25.) I adopt this name for a form widely distributed, but variable. Sometimes it resembles *C. triplicatum* in size and shape, but differs in the number and arrangement of the granules, which are not in series of threes but in continuous concentric rows. Sometimes they cover the upper half of the semi-cell, then again only one or two rows occur within, but near, the margin; the centre and basal half are usually nude. The semi-cells are not so straight-sided as figured by Delponte, but the front and end views are always more or less rectangular-oblong.

Reinsch has called a very different form by this name; it is nearly if not entirely identical with *C. cyclicum*, Lund.

C. sphalerostichum, Nord. (Figs. 26 and 27).—New Jersey and Pennsylvania. Resembles *C. orthostichum*, Lund., but is somewhat smaller; ends truncate and granules not so regularly arranged.

C. LOBATULUM, *n. sp.* (Figs. 33 and 34).—Small, one-third longer than wide, end of semi-cell broadly truncate; sides convex, with slight contraction near the end; side view circular with end truncate. Membrane finely and closely granular. Diameter 25μ; length 33μ.

Stillwater, Minnesota.

C. circulare, Reinsch. (Fig. 37)—Toevi marshes, Florida.

C. perforatum, Lund. (Fig. 32).—Near Minneapolis, Minn.

C. INFLATUM, *n. sp.* (Figs. 18–20).—Cell one-half longer than broad; semi-cell gradually enlarged from a narrow base to the broadly dilated end; end view broadly elliptic; lateral view circular, with slightly flattened sides; membrane finely punctate or smooth. Diameter 25–28μ; length about 40μ.

Ponds in Minnesota. *G. pseudoprotuberans*, Kir., has something in common with this form, but the semi-cells are separated by the narrow linear sinuses between them; *C. inflatum* has an obtuse-angled sinus.

C. (*Euastrum*) *Sendtneranium*, Reinsch. (Figs. 30–31).—I have received a number of good specimens from Minnesota identical with Reinsch's figures and description. In outline it approaches *C. nasutum* (*v.* D. of the U. S., p. 89), but that is a strongly granulated species.

C. Braunii, forma *major*, Reinsch. (Figs. 28–29).—Stillwater, Minnesota.

C. læve, Rab. (Figs. 35 and 36).—I have described this species in Des. U. S., p. 62. Membrane finely granular, which is sometimes the character; *v.* Nord. et. Wittr. Ital. et Tyr. Coll., p. 29. The figures represent a smooth form, in accord with the name and description by Rab. *glabrum et lævissimum*. I received large numbers the past summer from the basin of a fountain in Pottsville, Penn.

Xanthidium fasciculatum (Ehrb.) Ralfs., var. SUBALPINUM, *n. var.* Prof. Delponte, in his Sp. Desmidiacearum Subalpinarum, p. 168, plate 13, describes this species differently from that described in Des. U. S., the variation being mainly in the wider separation of the lateral spines. To distinguish the two I make the above variety.

Not rare in ponds of Minnesota or New Jersey.

X. COLUMBIANUM, *n. sp.*—Cells about one-third longer than wide, divided by a deep constriction, which forms much ampliated acute-angled sinuses; semi-cells oblong-hexagonal, superior and lateral angles each produced into a firm aculeus; within the margin, four, often indistinct aculei; end view more or less regular hexagonal, each angle somewhat produced and surmounted by a firm aculeus; within the margin are four aculei, the ends of which often extend over the margin; cytioderm smooth. Diameter 60μ; length 80μ without aculei.

Ocean Co., New Jersey.

X. TORREVI, *n. sp.*—Small, of nearly equal length and breadth, semi-cell somewhat hexagonal, half as long as wide; superior and lateral angles slightly protruding and surmounted each by a firm, straight, or slightly bent aculeus; end elliptic with one aculeus on, and another within, the margin of each end; on each side, a rounded prominence peculiar to the genus. Lateral view elliptic, with a constriction in the middle; two aculei at each end and two short tips evident near the middle. The inflations or rounded prominences are seen near the juncture of the semi-cells. Diameter 33μ without aculei, and, with them, 65μ; length about 75μ.

Ocean Co., N. J., particularly Horicon Lake. On the green, sloping banks of this beautiful sheet of water is the home of the venerable brother of the late John Torrey of botanical fame, and in happy remembrance of whom this new plant is named.

Euastrum crassum (Bréb) Kg., var. *scrobiculatum*, Lund.—Diameter 70–75μ; length 125–150μ.

Malaga and other places, New Jersey.

E. MAGNIFICUM, *n. sp.*—The largest of our *Euastra*; about

twice as long as broad; semi-cell five-lobed, the terminal lobe exserted; neck short, dilated, with end somewhat convex; the basal and intermediate lobes entire, with a deep obtuse notch between; upper margin of the basal lobes nearly horizontal and parallel; no prominent scrobiculæ, but one large central undulate inflation shown in lateral view. End view shows the terminal and intermediate lobes notched at each side. Diameter 100μ; length about 190μ.

Near Malaga and Manchester, N. J.

E. PURUM, *n. sp.*—Small, short; semi-cell three-lobed, broader than long; basal lobe much inflated, terminal lobe short, dilated and notched; in lateral view the base and end are more or less inflated. Diameter 35–45μ; length 55–70μ.

The smaller forms from Florida; the larger from Brown's Mills, New Jersey.

This new species is separated from *E. ansatum*, Ehrb., by the decidedly dilated terminal lobe and more strongly inflated basal lobes.

E. cuneatum, Jenner.—Harvey Lake, Lycoming Co., Penn., and occasionally in New Jersey ponds.

E. pectinatum, Bréb.—Semi-cell 3-lobed, terminal lobe dilated, usually entire; lateral lobes broad, making the basal portion of the semi-cell somewhat quadrilateral, horizontal, and, at each side, emarginate; lateral view cuneate, with two swellings near the base and one at the apex; transverse view oval, with three lobules on each side and one (or imperfectly two) at each end. Diameter 40–50μ; length about 75μ.

Minnesota. Although common in England, I obtained this year the first specimen found in the United States. A number of varieties of this species has been described by specialists in different countries. The present is not Ralf's typical form, but a variety.

Micrasterias apiculata, Menegh.—Harvey Lake, Luzerne Co., Penn., and Stillwater, Minn.

M. SPECIOSA, *n. sp.*—Small, somewhat longer than broad, five-lobed; lateral lobes unequal, the basal lobes usually with only half as many divisions as the intermediate ones; basal lobe bifid, and intermediate lobes twice bifid; the angles of each section drawn out into two spine-like points; terminal lobe rather narrow, linear; end exserted and much dilated, usually with three prominent mucros at each angle, centre retuse and raised, standing free, with a gap between it and the intermediate lobes; a series of small spines often to be observed on the margins of the lobes. Diameter of Florida form 95μ; length 110μ; of New Jersey form, diameter 125–150μ; length 155–165μ.

This species is nearly related to *M. radiosa*, var. *ornata*, Nord., but is smaller; the lobes are not so often and so deeply intersected, and the polar lobe is more exserted and has the end more dilated.

STAURASTRUM CORNUTUM, *n. sp.* (Figs. 3 and 4).—Medium size, about one-fourth longer than wide, smooth; semi-cell oval or broadly elliptic, with a prominent, somewhat inwardly curved aculeus on each side; end view triangular, angles rounded, each with a firm spine, sides straight or slightly concave. Diameter 55–60μ; length about 70μ. Spines not included in these measurements.

The front view resembles that of *Arthrodesmus convergens*, Ralfs, but the triangular end view proves it to be quite distinct.

St. Anthony Park and other localities, Minn.

ST. VESICULATUM, *n. sp.*—Small, smooth, about one-half longer than wide; constriction deep, sinuses acute-angled, much ampliated; semi-cell short, ovate or sub-pyramidal, not so long as broad; base wide, lower angles rounded, sides convex and inclining to the rounded apex; end view triangular, angles rather broadly rounded, sides slightly convex or straight. Diameter 31μ; length 45μ.

Differs from *St. cordatum*, F. Gay, in front view; sinuses are not narrow linear, but much ampliated, thereby giving the cell a more elevated appearance.

Green's Lake, New Jersey.

St. bacillare, Bréb. (Figs. 5 and 6).—Near Minneapolis, Minn. Brébisson describes a form of a French species as *St. globosum* which is somewhat stouter and partially granular, but nearly similar in form; the two have therefore been very properly considered as one by recent botanists.

St. Maamense, Archer (*St. pseudocrenatum*, Lund.) (Figs 9 and 10).—St. Anthony's Park, near Minneapolis, Minn.

As Archer's name antedates Lundell's, it is entitled to stand.

St. erasum, Bréb., forma *espinulosa*, Lund. (Figs. 16 and 17). Green's Lake, New Jersey.

ST. XIPHIDIOPHORUM, *n. sp.* (Figs. 21 and 21).—Small, one-half longer than broad; deeply constricted, sinus narrow, rounded at base and widened irregularly; semi-cell transversely oblong, with lateral margins notched; the end margin drawn out into a sort of one-sided, hastate, poignard-like spines, or slender points, about nine in number; membrane smooth, with several scrobiculæ; end view triangular, angles broadly truncate and usually three-lobed, each lobe with a vertical spine; sides concave. Diameter 25–30μ; length 40μ.

Near Stillwater and Minneapolis, Minn.

When sending me this beautiful and remarkable little *Staurastrum*, Miss Butler called my attention to "*the little gothic structure*," a very appropriate comparison.

ST. MINNEAPOLIENSE, *n. sp.* (Figs. 11–13).—Small, verrucose; semi-cells in front view sub-cuneate, with each of the two opposite superior angles drawn out into a short arm, with sides serrate and apex finely toothed, diverging from the arm of the connected semi-cell; end view, arms straight, body much elevated on each side; side-view, arms straight, body much raised in the centre and crenate on the apex. Diameter, f. v., 50–58μ; thickness of body 20–25 μ.

The front view not unlike other species, but the side and end views quite distinct in the unusual inflation of the body.

ST. CALYXOIDES, *n. sp.* (Figs. 14 and 15).—Nearly equal in length and breadth; smooth or finely punctate; deeply constricted; semi-cells saucer- or calyx-shaped, bearing on the undulate margin five equally distant divergent spines; end view pentagonal, each angle produced and bearing a strong aculeus. Diameter about 33μ, without, and 75μ with, the aculei.

Near Manchester, Ocean Co., and Green's Lake, Warren Co., New Jersey.

ST. MINNESOTENSE, *n. sp.* (Figs. 7 and 8).—Large, punctate, spinous, about as long as broad; semi-cells broadly elliptic, twice as wide as long, lateral angles each with two large, straight or incurved spines or aculei, three more pairs of similar spines placed slightly within the margin of the end, one on each side of the semi-cell; six more, often inconspicuous, arranged around the centre; end view triangular, with two spines at each angle, and two pairs near the margin between the angles, one on each side of semi-cell; around the centre are nine more, but often indistinct, spines. Diameter 65–75μ without and 90–100μ with the spines.

Frequent in Minnesota ponds.

ST. WOLLEANUM, Butler. (Figs. 1 and 2). Medium size, membrane punctate, about one-half longer than broad, moderately constricted, sinuses obtuse angles; semi-cell broadly oval or subhexagonal, superior and lateral angles produced into subcylindrical, somewhat swollen processes or arms, slightly notched at the apex; four more similar processes within the margin; end view regular, hexagonal, each angle furnished with an arm as in front view; within the margin, arranged in a circle around the centre, are six more and less conspicuous processes. Diameter of body 40 by 50μ; with arms, 65 by 83μ.

Vicinity of Minneapolis, Minn.

This species was discovered and identified as new by Miss E. Butler, who declines to have the name changed.

New Grasses.

By GEO. VASEY.

TRISETUM LUDOVICIANUM.—Culms 2 to 2.5 ft. high, stout, erect, smooth, leafy; lower 3 or 4 leaves near the base 6–10 inches long, the margins and sheaths pubescent; upper leaves (2) larger and with long, striate, smooth sheaths, the upper sheath 9–10 inches long and reaching to the base of the panicle, blade 6–10 inches long, 3–4 lines wide, roughish. Panicle 6–10 inches long and about one inch wide, erect, nodding at the apex, rather loose, the branches semiverticillate, erect, mostly in fives, unequal, the longer ones 2 to 4 inches long and flowering nearly to the base, the rachis and pedicels smooth or nearly so, pedicels about as long as the flowers; spikelets 2- to 3- (mostly 2-) flowered, the lower flower unawned; outer glumes smooth or slightly hispid on the keel, 2.5 to 3.5 lines long, 3-nerved, acute, with broadly scarious margins, the upper obovate, the lower rather shorter and narrower; the flowering-glume of the lower flower 3–3.5 lines long, narrowly lanceolate, nearly smooth, acute or acutish, but not bifid; second flowering-glume 2–2.5 lines long, punctulate scabrous, rather thicker than the lower one, with a rather scarious margin, acuminate, but hardly toothed at the apex, obscurely 3-nerved, dorsal awn from the upper fourth, as long as or longer than its glume, the palets one-third shorter than the glumes, membranaceous, bifid at the apex; rhachilla sparsely pubescent, terminated with a short rudiment, or occasionally with an imperfect flower.

Found along the borders of a cane-field in Louisiana, by Rev. A. B. Langlois. Doubtfully referred to the genus *Ventenata* by Prof.

Hackel, but I think its affinity is clearly with *Trisetum*. Very nearly the same structure of flowers occurs in *T. palustre*.

LEPTOCHLOA LANGLOISII.—Culm smooth, stout, leafy, 3 to 4 ft. high, the radical leaves one-third as long as the culm, loosely sheathing the base of the culm, joints or nodes 7 or 8, the sheaths compressed, striate, loose, rather glaucous, the leaves a foot long, 3 to 4 lines wide, keeled, somewhat scabrous, the upper one sheathing the base of the panicle; panicle racemose, 10–12 inches long, 2 inches wide, loose, erect or nodding above, the simple branches very numerous (100 or more), crowded below, erect-spreading, irregular on the axis, singly or 2–3 together, 2 to 3 inches long, mostly less than half an inch apart, flower-bearing throughout; spikelets 3–4-flowered, sessile and imbricated, about one and a half lines long; outer glumes unequal, membranaceous, ovate-lanceolate, acute, slightly scabrous on the keel, the lower about half a line, the upper about one line long; flowering-glumes little more than one line, lanceolate, acute or short-mucronate, 3-nerved, slightly pubescent on the keel, and ciliate on the marginal nerves below; palet a little shorter, bidentate.

This large and showy species was found in Louisiana by Rev. A. B. Langlois, for whom it is named.

LEPTOCHLOA NEALLEYI.—Culms 2 to 2.5 ft. high, and, with the sheaths, smooth, with about three nodes; leaves 6–10 inches long, 2–3 lines wide, the sheaths loose and striate, the upper one long and sheathing the base of the panicle; panicle 8–10 inches long, narrow, the simple branches about one inch long, in threes or fives, or partly scattered, closely flowered; spikelets small (little more than a line long), 3–5-flowered; outer glumes unequal, ovate, acutish, thick and green on the keel, the lower, half as long; flowering-glumes .5 to .75 line long, 3-nerved, oblong, sparsely pubescent on the nerves, the apex emarginate, obtuse and finely denticulate; palet narrow, as long as the flowering-glume, 2-keeled, finely pubescent on the keels.

Collected in Texas by Mr. G. C. Nealley, for whom it is named. Probably this and the preceding have been collected before, but so far as I know have not previously been named.

A New Cyperus.

By N. L. BRITTON.

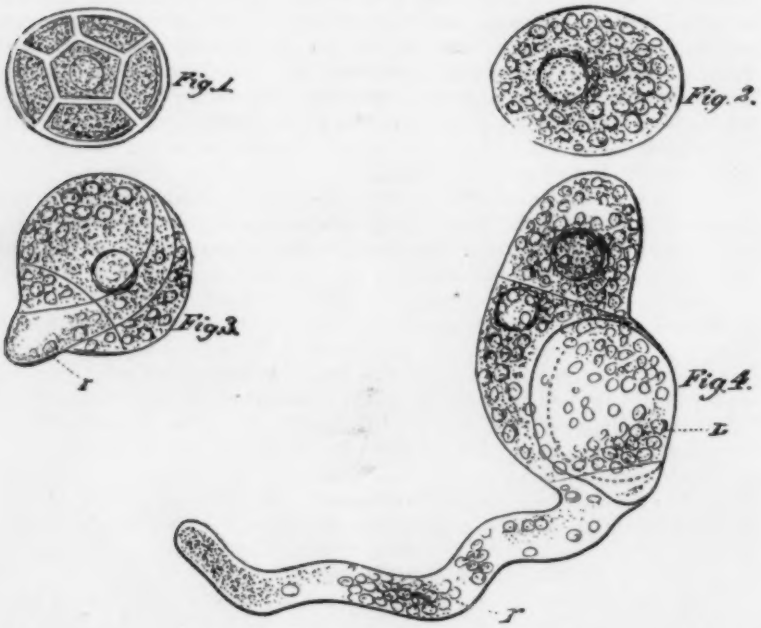
CYPERUS PRINGLEI, *n. sp.*—Culm upright, about 2 ft. high, sharply triangular. Leaves smooth, except the scabrous margins, 8–12 inches long, 2–3 lines wide. Involucre of 5 or 6 narrow leaves, the longer 6–8 inches in length. Umbel simple or somewhat compound, of 5–6 rays, 2–3 inches long and with several sessile heads. Simple heads one inch long, 2–3 lines wide, involucellate, with setaceous bracts, composed of 20–30, scattered, lanceolate, acute spikelets. In the compound heads the spikelets are more numerous, and the involucels more prominent. Spikelets 1.5–2 lines long, of 3 or 4, acute, ovate to ovate-lanceolate, 9–11-nerved scales, a single one fertile in each, the lowest one persistent on the axis of the head. Spikelets minutely subulate-bracted. Achenium oblong or oblong-obovate, acutely triangular, a line or less in length. Style 3-cleft. Stamens 3. Root hard, bulbous, provided with thick fibres.

Recently received from Mr. C. G. Pringle; collected in August, 1884, in Southern Arizona.

The plant somewhat resembles *C. Californicus*, Watson,* but differs in its narrow leaves, shorter involucre, shorter and non-flexuose, fewer-flowered spikelets.

A Third Coat in the Spores of the Genus Onoclea.—The presence of three coats in the spores of *Equisetum* has long been known to botanists, but, as far as I am aware, it is generally supposed that no ferns have more than two.

Having had occasion to repeatedly study the germination of the spores of *Onoclea Struthiopteris*, I was for a long time perplexed by



the appearance of certain lines on the surface of the spore which I could not explain.

For some time these were not noticed in the spore at the commencement of germination, owing to the opaque nature of the contents; but, as the cells became larger and the contents clearer, these lines became very conspicuous.

After repeated sowings of spores, and careful study of the first stages of germination, specimens in the condltion of Fig. 3 were found in which the root-hair was apparently developed from the interior of the spore and protruded through the wall. Further investigation showed beyond any doubt that the supposed endospore

*Bot. Cal., ii., 216 (*C. speciosus*, Torr., Mex. Bound. Surv., 226.)

actually split, and that through the cleft at one end the root-hair protruded, and at the other the first cell of the prothallium. The spores of the ferns of the genus *Onoclea*, as is usual in other ferns, are covered with a thick, dark brown exospore, or coat. (Fig. 1.) In most ferns this remains attached to the basal cell of the prothallium, concealing a large portion of it, and, indeed, this is often the case in both *O. Struthiopteris* and *O. sensibilis*, but in many cases in both ferns it is completely detached by the swelling of the spore in germinating, leaving the spore apparently covered only with a thin, transparent membrane (Fig. 2.) At the commencement of active growth, however, this membrane is seen to split along one side, and through the cleft thus formed the true endospore protrudes in the form of a root-hair at one end, and the basal cell of the prothallium at the other, which soon becomes separated from the root-hair by a transverse septum (Figs. 3 and 4.) In Fig. 4 the basal cell has become again divided so as to form two cells besides the first root-hair. At this stage, with a little care, the two lobes of the second covering (Figs. 4 and 5, L) can be clearly seen. The edges of

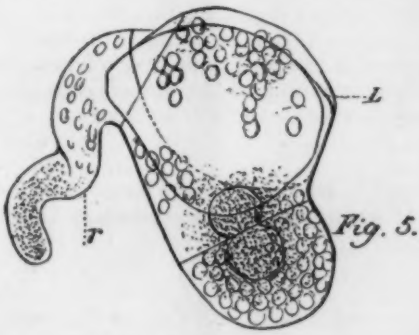


Fig. 5.

these lobes were the lines that puzzled me first. These lobes follow so nearly the lobes of the exospore, in those cases where it remains attached, that it is then impossible to detect them.

This accessory covering of the spore was first observed in *O. Struthiopteris*, but, knowing the close resemblance of the spores of *O. sensibilis* to those of the former species, I conjectured that the same peculiarity might be detected in them, and experiment showed that this was the case. I have not detected it in other genera examined, but, as in all cases, the exospore adhered so firmly to the spore as to interfere seriously with observations, I do not think it at all impossible that it does exist.

These observations may be readily verified in either species, as the spores germinate in a few days if simply placed in water and kept in a warm place.

EXPLANATION OF FIGURES.—1. Spore of *O. Struthiopteris* still enclosed in the exospore. 2. A similar spore in which the exospore has been cast off. 3. Spore with the second coat split, allowing the root-hair (*r*) to protrude. 4. Older prothallium, showing the lobes of the second coat (L.) 5. Similar prothallium of *O. sensibilis*. All magnified 500 diameters.

DOUGLAS H. CAMPBELL.

The Introduction of Extra-limital Plants.—To what degree is our flora influenced by designed introduction of extra-limital plants? A person in no way a botanist, though after his fashion a lover of the woods, confessed to me that he was in the habit during his rambles of scattering seeds of foreign or western plants here in Rhode Island. Now, if these germinated, as no doubt they often did, they would give rise to plants quite extra-regional. This, when it first was noticed, might cause the experienced student no great annoyance, but it is easy to see that after a while, and when well established, they might easily mislead. There is no way that I can suggest of stopping such a custom in our free country. The question is how far is it reprehensible?

W. W. Bailey.

Leaves of the Abietineæ.—Botanists will be glad to avail themselves of the opportunity to study the structure of the leaves of the *Abietineæ* of the United States and judge for themselves as to the value of the specific characters afforded by the position of the resin-ducts and the number and nature of the hypodermic cells; and I therefore take pleasure in announcing that Mr. J. D. King, of Cottage City, Mass., has prepared from material furnished from the collections of the Harvard Arboretum, and now offers for sale, beautifully mounted sets of microscopic slides showing cross-sections of the leaves of the sixty species of the United States.

C. S. Sargent.

Corema.—I find in Rev. J. Fowler's list of New Brunswick plants, *Corema Conradii* "abundant in sphagnous bog in rear of Carleton, N. B."

W. W. Bailey.

Shortia.—A correspondent, referring to the note on *Shortia* in the December Bulletin, suggests that Mr. Hyams would have come nearer the truth had he said the plant "is *sold* out" instead of "*dying* out," in view of the fact that he has for the last few years been advertizing to supply specimens at ten dollars each.

James F. Robinson, a well-known collector, at one time Secretary of the Botanical Exchange Club, and more lately connected with Owens College, Manchester, died quite suddenly on the 1st of November last, aged 46 years. A few years since he felt compelled to part with his herbarium, library and diagrams, and the writer secured many of his plants, volumes and maps, either for himself or Providence institutions.

W. W. B.

Botanical Notes.

The Nectar-Glands of the Cruciferæ.—M. J. Velenovsky, in a paper of fifty-six pages (*Bull. de la Soc. Tcheque des Sciences*, 6, xii., 1884), has drawn attention to the characters of the nectariferous glands in the Cruciferæ, which he believes might be employed in characterizing some genera and even larger groups. Thus the ab-

sence of the superior nectaries may be said to characterize the *Alyssineæ*, *Lunariæ* and *Cheirantheæ*. The form of the nectaries may also serve as a diagnostic character of some genera. The author gives a table of the classification of the Cruciferæ with the application of the new characters.

Botanical Literature.

Botanical Contributions, 1884–85. By Asa Gray. Proc. Amer. Acad. Arts and Sci., xx., 257–317.

The first part of this paper by Dr. Gray consists of a critical revision of some genera of *Borragineæ*, made necessary by recent discoveries. The revisions give us now two species of *Omphalodes*, one arctic, and one (*O. Howardi*, Gray, n. sp.) from Montana and Washington Territory, also two species in Western Mexico. A number of species of *Eritrichium* and some of other genera are referred to the genus *Krynitzia*, Fisch. and Meyer, the characters of which are extended, and which contains 45 North American species, eight of them new to science. Other species of *Eritrichium* and *Echidiocarya* become *Plagiobothrys*, Fisch. and Meyer, of which we have 13 representatives. *Echidiocarya* has but a single species, *E. Arizonica*.

Under "Notes on some American Species of *Utricularia*" reference is made to the drawings of Major Le Conte intended for illustrating his observations on the genus, *and now in possession of Mr. I. C. Martindale. *U. personata*, Le Conte, is *U. juncea*, Vahl.; *U. longiciliata*, A. DC., and *U. simplex*, C. Wright, both Cuban species, have been detected in Florida; "*U. tubulata*, L., var. *cleistogama*, Gray, seems to be not uncommon. The late Dr. Garber collected it in Florida, and Mrs. Owen sends it from the island of Nantucket." We may add that it has recently been found again in the New Jersey pines by Prof. J. A. Allen.

Six new genera, each of a single species, are described from the Southwest. They are *Veatchia* (*Rhus Veatchiana*, Kellogg) from Lower California; *Lyonothamnus* from Santa Catalina Island; *Pringleophytum* from Sonora; *Phanlothamnus* of the Phytolaccaceæ from Sonora; *Himantostemma*, also Sonoran; and *Rothrockia* of Southern Arizona. The last two genera are of the Asclepiadeæ. Two other new species of this order are described, viz: *Lachnostoma Arizonicum*, Gray, and *Acerates bifida*, Rusby, a very peculiar species with two-parted hoods, of which a single specimen only was secured.

Dr. Gray describes also thirty-nine new species of Gamopetalæ and remarks on others. Among the new ones we note *Schweinitzia Reynoldsiæ* from East Florida, and *Cassiope oxycoccoides* from Behring Island, off Kamtschatka.—N. L. B.

A Manual of the Medical Botany of North America. By Laurence Johnson, A.M., M.D. 8vo., pp. 290. Library of Standard Medical Authors. Wm. Wood & Co., New York, December, 1884.

Since the publication of Rafinesque's treatise on medical plants, no work of extensive scope has appeared in which our various native

*Ann. Lyc. Nat. Hist., i, 72.

and naturalized species reputed to be of value in the practice of medicine have been discussed and described. The book here noticed thus supplies a want which every intelligent practitioner and student must have felt, and presents in condensed form the results of the author's studies for a number of years in this neglected field. Commencing under the heading "Elements of Botany," it presents clearly and concisely the life-history of flowering-plants, explains the names given to their parts, and the principles of botanical classification, with a glossary of botanical terms. Succeeding this, and forming the larger portion of the work is a critical account of nearly all the American plants which are, or have been, employed in medicine, statements of their geographical distribution and habitat, the parts used in the various pharmaceutical preparations, with the chemical constituents of the same, and their medical properties and uses. It is noteworthy that comparatively few of the species which have been used in medicine are really proved of sufficient importance to be recognized as valuable therapeutical agents. The number condemned or questioned is far greater than that admitted to be useful The plants are considered in the order of their arrangement in Dr. Gray's Manual of Botany. The book is well printed, carefully indexed, and beautifully illustrated with 160 wood-cuts, and with superb chromolithographic plates of *Podophyllum peltatum*, L., *Liriodendron Tulipifera*, L., *Sanguinaria Canadensis*, L., *Geranium maculatum*, L., *Cornus florida*, L., *Viburnum prunifolium*, L., *Gelsemium sempervirens*, Ait., *Cypripedium pubescens*, Willd., and *Aspidium marginale*, Swartz, from original drawings by the author.—N. L. B.

The Fresh-Water Flora and Fauna of Central Park. By L. P. Gratacap and A. Woodward. Pamphlet, pp. 19, reprinted from *Sci. Amer. Supplem.*, ,Dec. 27, 1884.

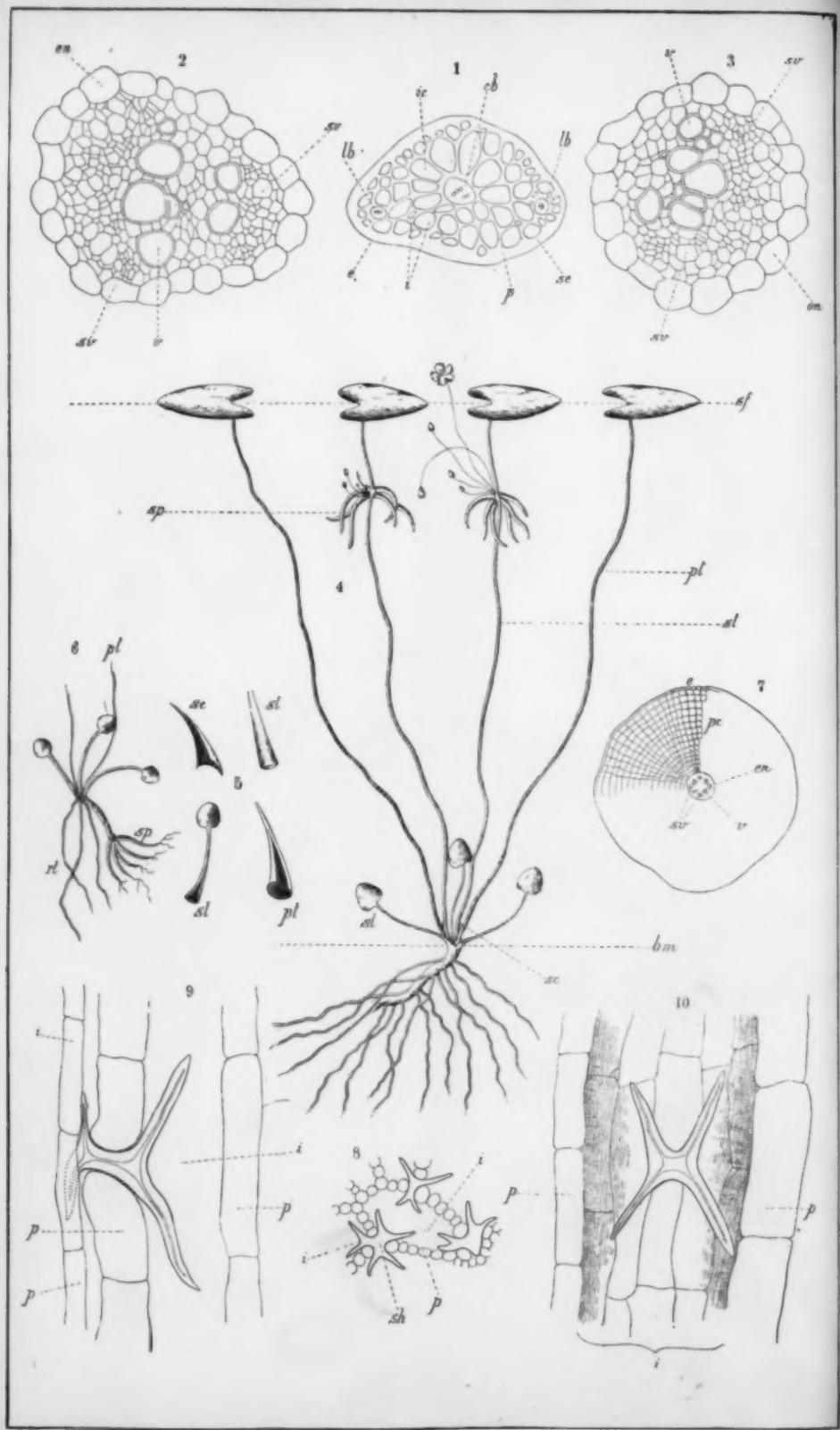
This interesting paper concisely presents the results of the past year's study by Messrs. Gratacap and Woodward of the life existing in the larger fresh-water lakes. In the investigation of the flora they appear to have confined themselves to the Algæ, no phanerogams being given in the list of species detected. This includes 22 of *Confervoideæ*, 7 of Desmids, 26 of Diatoms and 3 Bacteria. The paper is preliminary to a more exhaustive report. It contains a valuable contribution to the bibliograpy of fresh-water floræ and faunæ of the United States, mostly microscopical.--N. L. B.

List of, and Notes upon, the Lichens collected by Dr. T. Bean in Alaska and the adjacent region in 1880. By Dr. J. T. Rothrock.. 8vo., pamph., pp. 10. (From Proceed. U. S. Nat. Museum. Vol. iii, No. 1.)

Preliminary List of the Parasitic Fungi of Wisconsin. By William Trelease. 8vo., pamph., pp. 40. (From the Transactions of the Wisconsin Acad. Science.)

Notes on some Species of Gymnosporangium and Chrysomyxa of the United States. By W. G. Farlow. 8vo., pamph., pp. 16. (From Proceedings of Amer. Acad. Arts and Sciences.)

Notes on a Fungus parasitic on Species of Potamogeton. By W. G. Farlow. (From Transactions of the Ottawa Field-Naturalists' Club.)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BULLETIN
OF THE
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Vol. XII. New York, Feb. and Mar., 1885. **Nos. 2 & 3.**

Notes on Limnanthemum lacunosum, Griseb.

By Joseph Schrenk.

(Plate xlviii.)

In No. 3, Vol. x., of the Bulletin (March, 1883), Miss E. G. Knight reported the discovery of some submersed leaves in two specimens of *Limnanthemum lacunosum*, Griseb., collected in Nova Scotia. These leaves were "3 by 2.5 in., of a delicate texture, diaphanous, and of a light green color with a tinge of red," and had "a broader sinus than the floating leaves." In examining some specimens of our *Limnanthemum* that I had taken from Squam Lake, N. H., in 1881 and 1882 (in the month of August), I found that the submersed leaves of my plants were quite different from those described by Miss Knight. In 1883 and 1884 I gathered some more specimens from Squam Lake, and also some from Rockland Lake, N. Y., and from Bantam Lake, Conn., and found the submersed leaves of all the plants from these localities to agree in size and form with those taken from Squam Lake in previous years.

The blades of these leaves are only from 5 to $10^{mm.}$ wide and about $10^{mm.}$ long, and of various shapes, oval, obovate, broadly ovate, sometimes with truncate base, but always *without* any sinus. They are of a bright green color, without the reddish tinge peculiar to the floating leaves. The petioles are flat and from $2.5^{cm.}$ to $9^{cm.}$ long.

After having examined this interesting plant and its descriptions by the various authors, I venture to offer the following remarks as a contribution to the better understanding of its morphology and histology. What I especially propose to show is that the inflorescence is not inserted on the *petiole*, as stated below.*

* The latest published description of our *Limnanthemum* that I could find, is contained in the last edition (1883) of A. W. Chapman's Flora of the Southern United States, and reads thus: "*Limnanthemum*, Gmelin. Perennial aquatic herbs with floating, circular or cordate, spongy leaves, and white peduncled flowers clustered near the summit of the long petiole." In Wood's Classbook of Botany we find the following: "Petioles long, bearing the flowers in an umbellate cyme below the roundish leaf." Gray's Manual says: "Perennial aquatics, with rounded floating leaves on very long petioles, which, in most species, bear near their summit the umbel of (polygamous) flowers . . . sometimes shooting forth new leaves from the same place, and so spreading by a sort of proliferous stolons." In Gray's Synopt. Flora of N. A. we find the following passages: "*Limnanthemum*, Gmelin . . . the flowers in our species as if umbellate-fascicled on the petiole. . . . *L. lacunosum*, Griseb. Petioles and stolons filiform, much elongated: . . . umbel of flowers borne near to the base of the leaf. . . ." De Candolle, Prodr. ix., 139, Sect. ii., Nymphæanthe, Griseb.: "Cymæ petiolis insertæ." Cf. also Thos. Meehan, The Native Flowers and Ferns of the U. S., i., 93.

Limnanthemum lacunosum has a slender, ascending or horizontal rootstock provided with fleshy, fibrous roots, (Fig. 4). At the growing end of the rhizoma we first notice, above the sandy bottom of the lake or pond, a few of the submersed leaves described above *(sl)*. Their petioles are inserted by means of sheathing bases (Fig. 5, *sl*). Next, in centripetal order, we find growing on the rootstock some very long filiform petioles of uniform thickness and appearance (Fig. 4, *pt*), likewise provided with sheathing bases (Fig. 5, *pt*), and bearing the roundish floating blades with a deep acute-angled sinus. None of these undoubted petioles shows any sign of an inflorescence.

After removing the sheathing petiole-bases, we see some membranaceous scales about $10^{mm.}$ long, which taper from a broad clasping base to a sharp point (Figs. 4 and 5, *sc*). Occasionally these scales are more elongated and have green tips or even rudimentary blades; they are, in fact, much reduced leaves.

From the axils of the scales grow those organs which are described by authors as filiform *petioles* bearing near their summit the umbel of flowers, etc. (Fig. 4, *st*). As we shall presently see, they bear lateral organs; therefore, I do not hesitate to consider them as caulomes, and will henceforth call them *stems*. They are, indeed, very much like the filiform petioles metioned above, but from those they are readily distinguished by their position in the axils of the scales, by their somewhat flattened, but never clasping base (Fig. 5, *st*), and, above all, by their internal structure, to be discussed hereafter.

A short distance from the surface of the water *(sf)*, each stem bears a well developed node, from which one full-grown floating leaf is produced. The blade of this leaf is exactly like those of the leaves with filiform petioles, but its petiole is only from 1 to $5^{cm.}$ long (in one exceptional case as long as $24^{cm.}$), rather thicker than the stem, and has, at its base, a membranaceous sheath from which the clustered inflorescence and, closely above the same, the apex of the main axis are growing. This apex, however, rarely continues its growth vigorously during the same season; but we can often observe very small rudimentary leaves starting at this point, during and after the flowering season (Fig. 4).*

The apex of the stem is usually subtended by a cluster of spur-shaped, thick and fleshy rootlets (not tubers, as they are called by some authors), (Fig. 4, *sp*, and Fig. 7.) There can be no doubt that these rootlets sink to the bottom at the end of the growing season carrying with them the apex of the stem, which, in the next spring, gives rise to a new plant. I have frequently found these rootlets attached to the rootstock of young as well as older plants, indicating, in the latter case, by their withered and shrunken condition, the function which they had performed (Fig. 6).

We see from what I have said above that in *L. lacunosum* we meet with four distinct kinds of leaf-organs: 1st, the submersed

* According to A. Gray (Manual) the long petioles sometimes shoot forth new leaves from near the spur-like roots, thus spreading by a sort of proliferous stolons.

leaves, 2d, the floating leaves with filiform petioles, 3d, the scales on the rootstock, and 4th, the floating leaves with short petioles.

But in order to obtain entire satisfaction as to the difference between the filiform petioles and stems we must examine the internal structure of the same. The fibro-vascular centre of the *stem* (Fig. 2) is distinctly divided by a zone of parenchymatic ground-tissue into two bundles, each of which contains both vascular (*v*) and sieve tissue (*sv*), the latter situated toward the endodermis (*en*). In the fibro-vascular bundle of the filiform *petiole* (Fig. 3) there is but one set of xylem (*v*) and phloem (*sv*) with the woody tissue on the inner side. A line bisecting the two bundles of the stem forms an angle of about 45° with the median line, while the bundle of the petiole is symmetrically arranged, *i. e.*, it is bisected by the median line. The petioles of the other two kinds of leaves are, in this respect, exactly like the filiform ones. It is instructive to observe how the double bundle of the stem separates into two branches on approaching the node, one of them leading to the inflorescence and apex, the other continuing its course into the leaf.

Otherwise the stem and the petiole do not present any material differences. Both have two additional, much more reduced fibro-vascular bundles near the circumference, on opposite sides from the central one, with which they anastomize, at certain intervals, by means of obliquely ascending, tender branches. The bulk of the stems and petioles consists of large parenchyma cells which have very large intercellular channels between them, in the manner of so many aquatic plants. We find, stretched obliquely across these air-canals, some peculiar diaphragms formed of rather flat cells and pierced with numerous triangular intercellular spaces. Such diaphragms are considered as a mechanical contrivance to stiffen the walls of the air-canals in which they grow. Their occurrence in *Limnanthemum* is particularly interesting, because together with them are found those star-shaped cells so frequently observed in *Nuphar* and *Nymphæa;* for it has heretofore been thought that plants having these stellate "interior hairs" are not provided with any diaphragms.* The manner in which the former grow, leaves, with me, no doubt as to their office.

The walls of the intercellular channels (Fig. 8, *p*) are formed of single layers of cells among which the star-shaped ones are conspicuous by their great number, their form and their very thick, lignified walls. There are, however, not any of the granular crystals of calcium oxalate imbedded in the substance of the wall and projecting from it as with *Nuphar* and *Nymphæa.*† The several arms into which such a cell branches project into the intercellular passages (Figs. 8 and 9), and spread in front of the partitions (Fig. 10) into which the main body of the cell is inserted. Considering the length

*G. Haberlandt, Physiologische Pflanzenanatomie (1884), p. 300.

†G. Haberlandt, *l. c.*; E. Strasburger, Das botanische Practicum, p. 171. In our *Nymphæa odorata*, Ait., however, I have found very many "stellate hairs" with quite smooth walls, without the crystals mentioned in the text. They occur together with such cells as those of *N. alba* described by Strasburger, *l. c.*

of these branches, as well as the hardness and rigidity of these peculiar cells, together with their great number, we must assume that they serve as a mechanical contrivance to prevent the collapse of the wide air-passages which, without them, might take place on a sudden or gradual change in the radial pressure exerted on the plant by the water and the atmosphere.

This summer I planted a cluster of the spur-like rootlets mentioned above in some sand contained in a shallow dish and covered with a few inches of water. The bud above the rootlets soon sent up some of the submersed leaves, which, in shape and size, exactly resembled the ones collected from the actual habitat of the plant. But on closely examining their petioles I was surprised to find that they did not contain a single stellate cell! I do not venture to consider this single observation as a proof of the correctness of the above theory, but it certainly does not contradict it, and invites closer investigation.

Hoboken, December 1884.

EXPLANATION OF PLATE XLVIII.—Fig. 1. Cross-section of filiform stem. *e*, epidermis; *se*, sub-epidermal layer of parenchyma consisting of two or three rows of cells with few and small interstices; *i*, intercellular air-canals; *ic*, air-canal magnified in Fig. 8; *p*, partitions between air-canals; *cb*, central fibro-vascular bundle; *lb*, lateral bundles; x 36. Fig. 2. The central fibro-vascular bundle of Fig. 1, x 370. *en*, endodermis; *v*, ducts (annular and spiral); *sv*, sieve tissue. Fig. 3. Central fibro-vascular bundle of filiform petiole. Letters as in Fig. 2; x 370. Fig. 4. A few of the numerous stems, leaves, etc., of a full grown plant to illustrate its habit. The filiform petioles and stems of the original were about .5$^{m.}$ long. *bt*, bottom of lake; *sl*, submersed leaves, *sc*, scales; *pt*, filiform petioles; *st*, filiform stems; *sp*, spur-like roots; *sf*, surface of water. Fig. 5. Bases of leaf-organs. Letters as in Fig. 4. Fig. 6. Young plant that has grown from the spur-like roots, *sp*. Fig. 7. Cross-section of one of the spur-like rootlets (Fig. 4). *e*, epidermis; *pc*, parenchyma cells; *en*, endodermis; *v*, ducts; *sv*, sieve-tissue; x 36. Fig. 8. Intercellular canal, *ic*, Fig. 1, x 36. *sh*, stellate "hairs"; other letters as in Fig. 1. Fig. 9. Longitudinal section through air-canal and stellate "hair"; x 370. Fig. 10. Longitudinal section through air-canal, giving front-view of stellate "hair", the invisible half of which extends behind the partition into the contiguous air-passage; x 370.

All the powers given refer to the original figures as drawn with the camera; in the plate they appear reduced to one-half their size.

On the Mechanism of Anthesis in the Ericaceæ

By H. H. RUSBY.

As to the anthers, a strong distinction exists between the Pyrolineæ and the remainder of the Ericaceæ, in that the pores are basal in the former, apical in the latter. But this characteristic is not so readily made out as would at first appear. On examining a mature flower in any sub-order, the pores are found uppermost, and the only apparent indication of inversion in the Pyrolineæ is the common extrorseness of the pores, the anther itself being introrse. But even this distinction vanishes, nearly, in *Clethra*, where the poriferous horns are twisted so as to face laterally, and quite so in *Chimaphila*, where the horns are very short, and the openings look obliquely upward and inward. When we turn to the bud of *Clethra*, we find the filament doubled upon itself, so that the poriferous horns are pointing downward. In very young buds this reduplication of the filament is not apparent, the fold be-

ing so closely appressed to the anther. When, now, we read that the anther in Pyrolineæ is "normally extrorse in the bud" and that the pores are "really basal," the ordinary inference must be that it is this folding of the filament that constitutes the normal condition, and renders the pores truly basal. But again we are puzzled on finding that this same folding of the filament, producing reversion of the anther, in the bud, prevails in a number of genera of Ericineæ, particularly in the first and second tribes. Why then should the same condition be called normal in one case and abnormal in the other? Why should pores similarly placed be called basal in the one sub-order and apical in the other? Why should *Arctostaphylos* and *Arbutus* form one extreme, and *Clethra* and *Pyrola* the other, of a large family, the intervening genera differing in the most important characteristic in which these extremes agree? An answer is found in the existence in the Pyrolineæ of a second fold or turn of the filament at its point of attachment, thus placing it erect in the bud, and inverted in the flower, when the larger first fold has become obliterated. A careful study of this subject has proven so interesting that my observations have been committed to paper, and, with a few diagrams, are here given.

Fig. 1.

Fig. 2

Fig. 3.

Fig. 4.

I shall speak of the primary, obscure fold in Pyrolineæ as an *inversion*, which it really is, and the more evident, secondary fold, common to many genera, as a *reversion*. Suitable buds for this study not being commonly collected, I heve been unable to examine some genera at all, and in several others the buds were so old as to leave the truth merely inferential.

Inversion has been clearly demonstrated in *Clethra*, *Chimaphila* and *Pyrola*—*Moneses* not having been examined.

Reversion is certainly present in *Arbutus*, *Arctostaphylos* and *Cassiope*, and probably in *Gaultheria* and *Cassandra*. It has been excluded in *Leucothoe*, *Oxydendron*, *Epigæa*, *Andromeda*, *Calluna*, *Ledum* and *Rhododendron*. In *Menziesia*, so far as my observations go, it is very doubtful, and the other genera I have had no opportunity of examining.

My observations began with the study of *Arctostaphylos*, in February, 1881, when among the mountains of South-eastern Arizona I was waiting for the spring flowers to open, only *Arctostaphylos pungens*, HBK., *Brodiæa pauciflora*, Wats., and *Carphochæta Bigelovii*, Gray, being in flower.

The drawings made at that time are lost, but the plan of reversion

and restitution, being much the same as in *Arbutus*, I may illustrate by reference to figures of that genus. Fig. 1 illustrates a mature stamen of *Arbutus Menziesii*. The anther is erect, introrse both as to position and pores, attached very near its upper extremity, and furnished with a pair of curved horns projecting backward, the concavity of the curve looking directly upward. These horns seem to have their origin at, or very near, the upper edge of the pore, and to be adnate to an extent which varies in different genera and species, and in the same species at different periods. If now, we imagine this anther tipped over backward until it is exactly upside down, we shall have a part of what we find in Fig. 2, an illustration of a stamen from a young bud of the same species. That is, the anther would be reverted, and extrorse as to both position and pores, and the filament folded upon itself. But the horns would assume a different position, for they would project inward, the concavity of the curve looking directly downward. Such, however, is not the case in the bud. The filament is bordered by thin, but strong, transparent wings, and to this the horns

Fig. 5.

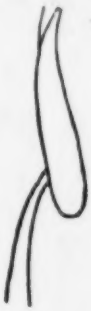

Fig. 6.

Fig. 7.

are firmly attached, apparently imbedded in its substance. The filament is at this time very short. From these observations, the design of the arrangement, and the use of the horns is very apparent. As the filament lengthens in its narrow quarters it becomes variously curved and cramped, so that at the first intimation of freedom, from the spreading of the corolla, which it probably hastens, it begins to straighten by pressing the anther in the only direction possible, namely, the apex (lower end) outward. It is evident that powerful assistance must be rendered by the elasticity of the growing horns, pressed, as they are, far out of their normal line. (See also Figs. 3 and 4.)

In *Arctostaphylos* the principle is the same, with slight differences in the details. It must be remarked that in this genus especially, the development and growth of the horns is very rapid. In the youngest buds that can be readily examined, the horns are scarcely discernible. The rapidity of their subsequent growth is well seen by comparing their length in the five precocious, with that in the other five anthers (best seen in *Arctostaphylos Uva-ursi*), for in all of these changes, five

of the anthers are constantly much in advance of the others. In this genus they become much longer, and instead of being, in the bud state, imbedded in the substance of a transparent wing ot the filament, they are attached thereto by abundant glutinous hairs belonging both to themselves and to the filament. Here, at least, the horns apparently have some part in cross-fertilization. In *A. glauca* they are so far doubled backward that their hairy and glutinous tips are approximated to the anther pores, so that being jarred by departing insects, a quantity of the pollen is shaken out upon them, to be held until the arrival of the next visitor. Futher evidence of the flowers being proterogynous was found in the presence, among the filaments and upon the viscid stigma, of a considerable quantity of pollen before the anthers of those flowers were yet mature. A large number of flowers was found punctured near the base with a large, angular aperture. Careful and long continued observation placed the mischief to the account of a humming-bird, which passed a large part of its time among the shrubs.

Cassiope does not differ essentially from *Arbutus*. Its horns are like those of *Arbutus* in slenderness, but are not quite so long, and are rather straighter.

Fig. 8.

Fig. 9.

The stamens of all the above genera agree in two important particulars: the filaments are attached quite near the apex of the anther, and the latter possesses backwardly projecting horns. Both these characters, as we have seen, are useful in overcoming the reversion of the anther. Now in *Gaultheria*, of which I have but a single bud to examine, and that an old one, we see the first step toward a condition in which both these characters are wanting, and where the anthers are never reverted. For in *Gaultheria* we have the "dorsal" awns, but the filament is not attached near the apex of the anther. (Fig. 5.)

In *Cassandra* (Fig. 6) the mechanism is still farther lost by the insertion of the filament near the lower end of the anther, and the almost straight direction of the stout horns, which thus become beaks. Here we are obliged to entertain the question as to the dorsal horns of *Arbutus* being the homologues of the terminal beaks of Vaccineæ (and *Cassandra*, etc.) which have become narrowed, recurved, and broken through at the base on the inner side to form the ventral pores.

As above stated, in neither of the two last genera was reversion clearly seen, and it was clearly excluded in all the others examined up to Pyrolineæ. But, in passing, one would call attention to the

existence of beaks in the thecæ of *Andromeda Mariana*. Fig. 7 illustrates a stamen from a rather young bud. The beaks, here so distinct, become less so as the flower matures, by their close approximation and adherence below. In the other species of that section, they are, even in the young state, beakless as described.

We now come to consider a very different condition, best seen in *Pyrola*. Fig. 8 represents a stamen from a moderately developed bud of *P. rotundifolia*. Here we see the same folding of the filament (reversion) as in the first class of cases, the poriferous extremities of the thecæ pointing downward, but at the same time inward. In the last particular they differ from all the above genera, and point to the inversion which is clearly shown in Fig. 9. In this case, one theca has been torn away, so that the direction of the fibres of the filament can be plainly seen at their actual point of insertion, again turning upward to become continuous with the connective. If, with a needle, we attempt to strip off the filament in a downward direction at the point *a*, we succeed in getting a transverse fracture at that point; while the same experiment with an anther of *Arbutus* similarly prepared results in the splitting off of the filament to the extreme end

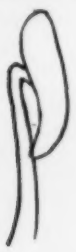

Fig. 10.

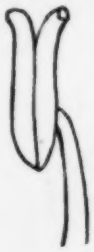

Fig. 11.

Fig. 12.

Fig. 13.

of the connective. It is clearly, then, this folding of the filament, hidden between the thecæ, that produces the inversion proper, and proves the anther to be erect in the bud, and the pores to be basal; notwithstanding that in the mature flower they are uppermost. As to the direction of the pores, it is evident that, pointing inward in the bud, their normal position, they must point outward in the flower, when the inversion has become effective by the disappearance of the counterbalancing reversion.

This extrorseness of the pores is permanent in *Pyrola*, but not in *Clethra* or *Chimaphila*, and in that genus it is overcome, at least partially, by the unilateral depression of the anthers. But in *Clethra* (Fig. 10, stamen from bud, Fig. 11, from mature flower) the beaks are elongated, divergent and twisted, so that the pores face laterally or nearly so. In *Chimaphila* (Fig. 12, bud-stamen of *C. maculata*, Fig. 13, flower-stamen of the same), the pores are practically introrse The manner in which they have become so is not clear, for in my only bud I found them extrorse in their reverted condition, and it is not known to how early a period this relation could be traced.

Some one will probably find a study of the buds of *Rhododendron* very interesting during the coming season.

Fern Notes. VII.

By Geo. E. Davenport.

Cheilantnes lanuginosa, Nutt., var. fibrillosa. (*C. fibrillosa*, Davenport, provisionally, in herbarium Mass. Hort. Soc'y).—I have now had in my possession for more than a year a strange *Cheilanthes* from California which has puzzled me greatly. Not being able to place it to my entire satisfaction, it was placed in the herbarium under the provisional name of *C. fibrillosa*, and held in reserve until the present time, when a careful re-examination leads me to refer it to *C. lanuginosa*, Nutt., as a variety. My principal object, however, in publishing it here is to call the attention of California botanists to it with the hope that it may lead to its re-discovery, and the collection of sufficient material to render its positive determination more certain.

It apparently comes between, and may ultimately unite, *C. lanuginosa* and *C. Parishii* (possibly *C. Szovitzii* as well), and the specimens indicate a plant of corresponding size. It lacks the characteristic scales of *Parishii*, and, while in every other way nearer to *lanuginosa* than to *Parishii*, differs from the former by its more rhizomataceous rootstocks, the presence of distinct fibrous hairs, or scales, intermixed with the tomentum, and a remarkable resemblance to *Notholæna Newberryi*, for which it might be mistaken, but for the strongly revolute margins of the segments.

A plant with so many characters not distinctly its own is not likely to be a welcome addition to this section of *Cheilanthes*, and may prove hereafter to be a source of much perplexity to botanists.

I give a partial description as an aid to those who may have opportunities to search for it:

Plant 3′ to 6′ (or more ?) tall; rootstock rhizomataceous, forming dense, entangled clumps of short rhizomes clothed with dark, or blackish-brown, linear-lanceolate scales that gradually pass into lighter brown, linear (more slender than in *lanuginosa*) scales mixed with coarse fibres and tomentum at the base of the stipites, the latter chestnut-brown, terete, 2′ to 3′ long, at first tomentose with fibrous scales and wool (similar to that on the roots), becoming smooth with age; laminæ of equal length with, or slightly longer than, the stipites, .75′ to 1.5′ broad, tripinnate, loosely covered with deciduous tomentum, that along the rachises beneath persistent, tawny, and mixed with coarse fibres—whence the name *fibrillosa*.

Collected by the brothers Parish well down in one of the passes that open out on the south side of the San Jacinto Mts., in June 1882. Mr. Parish thinks that it had descended from a higher altitude, where it may be looked for.

Cheilanthes myriophylla, Desv., (*C. elegans*, Desv.; *C. villosa*, Davenport, provisionally, in herb. Mass. Hort. Soc'y only. Catal. Supplement).—I have received from Mr. Pringle's rich collection of 1884 an unusually fine series of forms of this species collected by him on limestone cliffs on the Santa Rita Mts. in Arizona.

The series shows great variation in characters that have frequently been made use of for specific purposes (such as the size and shape

of the fronds or segments; the presence or absence, or character of the tomentum; or the color, size and character of the scales) the value of which I am now led to question more seriously than ever. Such characters, it seems to me, can only be taken in connection with others of a more reliable nature, and must occupy a secondary place in any description.

Some of Mr. Pringle's specimens run very close to *C. scariosa*, and I suspect fairly represent that species as reported from Mexico; others are inseparable from *C. elegans*, Desv., and others again from *myriophylla*. All of these differences are clearly due to the different conditions under which the different plants grew.

In reply to my inquiries in this direction, Mr. Pringle wrote:

"It (this species) is at home only in limestone ledges, in dryest situations where there is least soil 'short and rigid,' as you note, and in shaded places with more earth, or richer mould 'taller and more lax.' But it is all one species."

The series is identical with that previously collected in the Huachuca Mts. by Mr. and Mrs. Lemmon, which Prof. Eaton (correctly as I think) referred to *C. myriophylla*, with the exception that Mr. Pringle's plants vary more in the direction of *C. elegans*, Desv., and some of them are more densely squamose than any received from Lemmon.*

One can see from these collections that Dr. Hooker acted wisely in writing *C. elegans* and *C. myriophylla* under one name.

The plant given in the Supplement to my Catalogue, merely as a matter of record for the herbarium, under the provisional name of *C. villosa*, is probably only a form of this species, to which it must be referred.

Botrychium Virginianum, Swz., why *Botrychium Virginicum*?.— I had supposed that the correct synonomy of the *Botrychia* had become so clearly established through the labors of Dr. Milde, as pointed out by Prof. Eaton and myself, that no further corrections would be necessary, but Mr. Gilbert's note in the BULLETIN for July 1884, seems to indicate otherwise.

The right, *per se*, of every one to choose whatever name best pleases him may be undeniable, but in practice the wisdom of exercising that right is at least questionable as not tending to that uniformity so desirable in botanical science.

If we are to pay any regard to the laws of botanical nomenclature, then *B. Virginicum* ought no longer to be tolerated as against *B.*

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* Prof. Lemmon tells me that Mr. Baker refers his Huachuca Mt. plant to *C. seariosa*, but while I am inclined to believe that the very scaly forms of both Lemmon's and Pringle's collections are the same as the plant from Mexico, which has been referred to *C. scariosa*, although I have no specimen for comparison, I think a more careful investigation will be needed to show that they are identical with the Peruvian type of that species. Prof. Eaton thinks they are not, and until such time as I can make a satisfactory investigation for myself I should defer wholly to his judgment.

The large series of forms which I have received from Prof. Lemmon and Mr. Pringle, to both of whom I am under great obligations, has placed in my hands some long wished for material and I hope now shortly to finish my paper on the *Myriophylla-Fendleri* group of *Cheilanthes*.

Virginianum, which takes precedence by at least ten years earlier publication (O. Swartz, in Schrad. *Journ. Botan.* 1800–1801).

The species was collected in Arizona during the past year by Mr. Pringle along with *Ophioglossum nudicaule*, *Notholæna Aschenborniana*, *Pellæa cordata*, *Pellæa atropurpurea* *Notholæna nivea*, *Asplenium parvulum* and *monanthemum*, *Aspidium Filix-mas*, *Cheilanthes Pringlei*, and others.

Botrychium matricariæfolium, A. Br., why *Botrychium rutaceum*, Swz.?—The use of the name *B. rutaceum*, Swz. (Gilbert *l. c.*), as a synonym for this species is somewhat misleading. Dr. Milde has shown that Swartz was not acquainted with our plant, and that his *rutaceum* was only a form of *B. ternatum*, as verified in Swartz's own herbarium by Angström. There is therefore no propriety in writing *B. rutaceum*, Swz., for *B. matricariæfolium*, A. Br., at this late day, however much there might have been before the confusion into which the synonomy of the *Botrychia* was thrown by various writers was unravelled by Dr. Milde's masterly treatise.

I read Mr. Gilbert's note (*l. c.*) on the variation in the bud-forms in this species with much interest and pleasure.

I have myself previously recorded (see BULLETIN for September 1881) a single instance of variation in the bud-form of a mature specimen of this species, and of *B. simplex* also. Since that time I have examined a great many specimens without finding another instance, but have found the general character of the buds as heretofore described remarkably uniform and reliable. It should be remembered in connection with this that the full descriptions of the different buds in my vernation notes (BULLETIN, January 1878) were based upon mature vernation, and that sufficient qualification was made in the text for different stages of development. In reference to the present species, I therein stated that while the matured form of the bud is so distinct from that of every other species that one could not possibly mistake it for any other, yet, in its earlier stages of development, it at one time bears some resemblance to the matured bud of *B. simplex*, at another time to the matured bud of *B. Lunaria*, and only gradually assumes with its growth its distinctive character. It will be observed, however, that even in its youngest condition it is not only distinguished from the bud of *B. simplex* by the partially curved apex of the sterile portion, but by the significant development of the common stalk, that being by far the longest portion of the whole bud, whereas in *B. simplex* the common stalk is usually the shortest. To this, adding that, in the three smaller species, being given specimens of an equal and corresponding growth, the buds will be found to be distinct and characteristic.

These views I have as yet seen no reason to change, and it is to be expected from them that in this species, whenever from any cause plants fail to mature fully, some deviation from the fully described, matured venation is to be looked for, though not of sufficient character to prevent determination.

In cases, however, where there may be a doubt otherwise, an examination of the spores must be resorted to, as previously stated. (Vernation Notes, *l. c.*)

Woodsia Mexicana, Fée.—The *Woodsia* from Lower California mentioned in my Distribution Notes as likely to be *W. obtusa* proves to be this species instead.

Mr. Orcutt has now re-collected it and supplied me with sufficient material to render its positive determination reasonably certain.

My thanks are due to Mr. Orcutt for his kindness in this, and also for his efforts to procure for me other ferns, in which I trust he will yet meet with equal success.

Notes on the Flora of Yellowstone Park.

By Frank Tweedy.

There is probably not an area of equal size in the United States which has as varied topographical features as the region of the Yellowstone Park, with its elevated plateaux and lofty mountain ranges, cañons, rivers and cataracts. Here also is the great continental water-shed. The central portion is mainly a high, rolling, heavily timbered plateau varying from 7,500–8,500 feet above sea-level and bordered by mountain ranges on the west, north and east. It is to this interior region and to a few adjacent mountain summits that the following observations were limited. On travelling through the Park one is struck by the monotony of the forests as regards variety in species. The black pine (*Pinus contorta*, Dougl., var. *Murrayana*, Engelm.) is the prevailing tree at low altitudes, forming at least 90 per cent. of the forest area, mingled with a scanty growth of Douglas spruce (*Pseudotsuga Douglasii*, Engelm.) on sparsely wooded slopes. The latter are small and not to be compared with the noble tree of the Pacific coast. We were surprised at the general absence of the yellow pine (*Pinus ponderosa*, Dougl.), but probably the rainfall is too great for the healthy development of this species. Above 8,000 feet, and even lower, dependent upon situation as regards temperature and moisture, occur the spruce (*Picea Engelmanni*, Engelm.) and the fir (*Abies subalpina*, Engelm.). The latter, much resembling the eastern balsam fir in growth and habit, clothes the cold, wet mountain slopes up to the timber-line, which here is nearly 1,000 feet. The black pine is not entirely confined to the plateau region, but often ascends to the timber-line along the dryer ridges where it is frequently found with the western white pine (*Pinus flexilis*, James). A few red cedars are scattered over the sage-brush areas, and *Juniperus communis*, L., var. *alpina*, L., on alpine summits and more rarely around the geyser basins. A birch (*Betula occidentalis*) and the aspen (*Populus tremuloides*, Michx.) are mostly confined to moist bottoms along streams. Early in August we occupied a camp in a small opening, half bog, half meadow, on the eastern slope of the Gallatin Range. On either side were the fir-clad slopes of high mountain peaks. Scattered over the meadow were patches of low willows (*Salix Geyeriana*, Anders.) and birches (*Betula glandulosa*, Michx.) mingled with great quantities of *Potentilla fruticosa*, L., the most characteristic shrub of the mountain bogs. Blue gentians were massed in great profusion over the surface of the bog. *Gentiana serrata*, Gunner, everywhere, *G. Forwoodii*, Gray, and *G. amarella*, L., var. *acuta*, Hook., less

common, yellow senecios (*S. lugens*, Rich., and *S. subnudus*, DC.) and white flowers of various species. *Zygadenus elegans*, Pursh., *Antennaria carpathica*, R. Br., *Trifolium longipes*, Nutt., *Polygonum viviparum*, L., *Parnassia fimbriata*, Banks, and *Habenaria hyperborea*, R. Br. *Pedicularis* was represented by several species, *P. Grœnlandica*, Retz, *P. bracteosa*, Benth., and *P. racemosa*, Dougl. *Valeriana edulis*, Nutt., is a characteristic bog plant of the region. Hidden by this luxuriant growth were the more modest *Slellariæ* (*S. borealis*, Big., *S. longipes*, Goldie, *S. umbellata*, Turcz., *S. crassifolia*, Ehrh.) and *Androsaces* (*A. filiformis*, Retz, *A. septentrionalis*, L.). One of the most striking plants was a large cream-colored *Wyethia* (*W. helianthoides*, Nutt.), the species upon which Nuttall founded the genus. Grasses there were in abundance, many of the most nutritious kinds: the native timothy (*Phleum alpinum*, L.), *Deyeuxia Langsdorfii*, Trin., the blue joint of the region, *Poa Nevadensis*, Vasey, var. *glauca*, V. & S., a characteristic meadow grass, several species of *Bromus* (*B. brevaristatus*, Hook., *B. ciliatus*, *B. Kalmii*, Gray), *Danthonia*, *Melica*, *Trisetum*, *Festuca*, *Glyceria*, etc., all of which our horses and mules seemed to appreciate highly in the odd moments they snatched from fighting the myriads of gnats and immense horse-flies during the day time and the equally numerous and more persistent mosquitos at morning and evening. On the ascent of Mount Holmes the following day, new beauties and varieties in the flora met our gaze on every hand. The little streams tumbling down the grassy slopes of the mountain side were bordered with flowers growing with weed-like luxuriance, waist deep, blue *Mertensiæ* (*M. Sibirica*, Don.), yellow *Aquilegiæ* (*A. flavescens*, Wats.), white and crimson geraniums (*G. Richardsonii*, F. & M., *G. incisum*, F. & M. , the showy *Mimulus Lewissii*, Pursh., and above all waved the wand-like stems of aconites and larkspurs (*Aconitum Fischeri* and *Delphinium scopulorum*, Gray). On the borders of the scattered groves of fir were banks of melting snow, and over the cold wet ground around them were growing several pretty little alpine plants. Two clovers (*Trifolium Parryi*, Gray, and *T. Kingii*, Wats.), a dwarf *Ranunculus* with large, golden-yellow flowers (*R. affinis*, R. Br.), a prostrate *Mertensia* (*M. alpina*, Don.) and a delicate little aster very appropriately bearing the name of *Aster pulchellus*, Eaton.

A steep ascent of several hundred feet brought us upon an elevated plateau where a scene of great beauty burst upon our view. Spread out before us was a magnificent natural flower-garden, vivid scarlet and crimson *Castilleiæ* vied with purple lupines and carpet-like masses of snow-white phlox (*P. Douglasii*, Hook.) mingled with golden-yellow and orange flowers of every shade, *Helianthella Douglasii*, T. & G., *Ivesia Gordoni*, T. & G., *Sedum stenopetalum*, Pursh., arnicas and *Aplopappi*. A large-flowered *Townsendia* (*T. Parryi*, Eaton) was a conspicuous feature of the flora. Besides these there were *Clematis Douglasii*, Hook., the pretty *Cerastium arvense*, L., and erigerons and asters of several species. On reaching the bare summit of the mountain at an altitude of 10,000 feet, we stood for some moments gazing upon the panorama of the Park spread out before us. To the southward extended a rolling sea of dark green forest, broken

here and there by the white surfaces of the geyser basins, from which at intervals clouds of steam would shoot upwards, telling us of some geyser in eruption. Over the plateau below us were several elk leisurely making their way, and on a peak near by we watched a band of Rocky Mountain sheep travelling along what seemed to us to be the face of an almost perpendicular precipice. The bleak wind which swept the summit that we occupied hardly seemed favorable to plant-life other than the hardy lichens and mosses, and yet its flora proved to be quite extensive and varied, as the following species, collected over an area of a few square rods, will show: *Douglasia montana*, Gray., *Salix reticulata*, L., *Draba crassifolia*, Graham, *D. alpina*, L., *Smelowskia calycina*, *Myosotis sylvatica*, Hoffm., var. *alpestris*, Koch., *Eritrichium nanum*, Schroder, var. *aretioides*, Herder., *Arenaria stricta*, Wats , *Silene acaulis*, L., *Saxifraga oppositifolia*, L., *Oxytropis Lamberti*, Pursh., *Astragalus tegetarius*, Wats., var. *implexus*, Canby., *Dryas octopetala*, L., *Sibbaldia procumbens*, L., *Antennaria alpina*, Gaertn., *Artemisia scopulorum*, Gray., *Erigeron uniflorus*, L., *E. radicatus*, Hook.

In the treacherous hot spring bogs throughout the Park one will meet with a peculiar flora containing many species which are more or less familiar sea-coast plants, such as *Ranunculus Cymbalaria*, Pursh., *Potentilla Anserina*, L., *Rumex maritimus*, L., *Potamogeton pectinatus* (L.?) *Ruppia maritima*, L., and *Triglochin maritimum*, L.

There is a characteristic plant of the region, *Cnicus Drummondii*, Gray, which has a little romance connected with it in spite of its unprepossessing appearance. In 1870 one of a band of explorers in the then unknown region which is now the Yellowstone Park became separated from his companions and wandered alone for thirty-seven days through the dense forests and over the mountains, and was only saved from starvation by the nourishment derived from the roots of this thistle.

Contributions toward a List of the State and Local Floras of the United States.

THE INDIAN TERRITORY.

Catalogue of Plants collected in the Exploration, by Capt. R. B. Marcy, of the Red River. By John Torrey. (C.)
Washington, 1853. Appendix G.

List of some of the most interesting Plants collected in the Indian Territory. By G. D. Butler. (B.)
In Bot. Gazette iii., 1878, Logansport, Ind.

CATALOGUES OF TRANSCONTINENTAL EXPEDITIONS.

Descriptions of new Species and Genera of Plants in the Natural Order Compositæ, collected in a tour across the Continent to the Pacific, a Residence in Oregon, and a visit to the Sandwich Islands and Upper California during the years 1834 and 1835. By Thomas Nuttall. (D.)
In Trans. Amer. Philos. Soc. vii. (new series) 282.

List of Plants collected on a Military Reconnoissance from Fort Leavenworth, Mo., to San Diego, Cal. By John Torrey, M. D. (C.)

In Emory's Report of Reconnoissance, p. 136. Washington, 1848.

Botany of the United States and Mexican Boundary Survey. By John Torrey, the Cactaceæ by Geo. Engelmann. (C.)

Rep. U. S. and Mex. Bound. Survey, Vol. ii. Washington, 1859.

Botany of the United States Exploration of the Fortieth Parallel. (King's Reports.) By Sereno Watson, D. C. Eaton and others. (C.)

In Rep. of Exploration, Vol. v., 4to. Washington, 1871.

List of Plants collected by the North Pacific R. R. Expedition of 1873 under Gen. D. S. Stanley. By J. A. Allen. (B.)

In Proc. Bost. Soc. Nat. Hist. xvii., 1875.

THE UPPER MISSOURI REGION.

Catalogue of Plants collected in Long's Second Expedition. By L. D. DeSchweinttz.

In Keating's Rep. of Expedition. Washington, 1825.

The Sylva of Montana. By J. G. Cooper, M.D.

In Amer. Nat., iii., 405. (A.)

Catalogue of Plants collected during the Expedition of F. V. Hayden to the Headwaters of the Yellowstone River in the Summer of 1871, with a small number gathered by Dr. George Smith in August, 1871, on Gray's Peak and near Georgetown, Colo. By T. C. Porter. (The Mosses by L. Lesquereux and Lichens by E. Tuckerman.) (C.)

In U. S. Geol. and Geog. Surv. Montana and adjacent Terr., p. 477. Washington, 1871.

Catalogue of Phænogamous and Vascular Cryptogamous Plants collected during the summers of 1873 and 1874 in Dakota and Montana by Dr. Elliott Coues; with which are incorporated those collected in the same region at the same times by Mr. G. M. Dawson. By J. W. Chickering. (B.)

In Bull. U. S. Geol. and Geog. Surv., 1878, Vol. iv., No. 4. Washington.

Botany of the Black Hills of Dakota. By Asa Gray. (C.)

In Rep. on Geol. and Resources of the Black Hills by Henry Newton and W. P. Jenney. Washington, 1880, p. 531.

THE ROCKY MOUNTAIN REGION.

Catalogue of Plants collected during a journey to and from the Rocky Mountains during the summer of 1820. By E. P. James. (B.)

In Trans. Amer. Phil. Soc., Phila., Vol. ii., (new series) 1825. (Includes many species from the plains, and east of the Mississippi.)

Some account of a Collection of Plants made during a journey to and from the Rocky Mountains in the summer of 1820, by Edwin P. James, M.D. By John Torrey. (C.)

In Ann. Lyc. Nat. Hist., ii., 161, 1828.

Catalogue of a Collection of Plants made chiefly in the valleys of the Rocky Mts. or Northern Andes toward the sources of the Columbia River by Nathaniel B. Wyeth. By T. Nuttall. (C.)

In Journ. Phila. Acad. Sci., vii., 1834.

Catalogue of Plants collected in Wyoming and Colorado by Dr. F. V. Hayden and Mr. B. H. Smith, 1868, 1869, 1870. By T. C. Porter. (C.)

In U. S. Geol. Sur. Wyoming and contiguous Territory, 1870, p. 472. Washington, 1872.

A List of Plants collected by C. Thomas in Eastern Colorado and N. E. New Mexico during the Survey of 1866. By C. C. Parry, M.D. (A.)

In U. S. Geol. Surv. Wyoming and contiguous Territory, 1870, p. 484. Washington, 1872.

Enumeration of the Species of Plants collected by Dr. C. C. Parry and Messrs. E. Hall and J. P. Harbour, during the summer and autumn of 1862 on and near the Rocky Mts. in Colorado Terr., latitude 39° to 41°. By Asa Gray. (C.)

In Proc. Acad. Nat. Sci. Phila., 1863, p. 55.

Synopsis of the Flora of Colorado. By T. C. Porter and J. M. Coulter. (C.)

U. S. Geol. and Geog. Surv. Terr., Misc. Public., No. 4, 8vo. pamphlet. Washington, 1874.

The Flora of Southwestern Colorado. By T. S. Brandegee. (B.)

In Bull. U. S. Geol. and Geog. Surv. Terr., Vol. ii., No. 3, p. 227. Washington.

List of Colorado Musci and Hepaticæ, collected by T. L. Brandegee in 1873–75. By E. A. Rau with the assistance of C. F. Austin and T. P. James. (A.)

In Bull. Torr. Bot. Club., vi., 89, May, 1876.

Colorado Plants. By I. C. Martindale. (B.)

In Amer. Nat. xiii., 675. November, 1879.

Grasses of the Plains and Eastern Slope of the Rocky Mountains. (B.) Author not given.

In Dept. Agric. Rept., Washington, 1870, p. 217.

A catalogue of Plants collected in 1872 in portions of Montana, Idaho, Wyoming and Utah. By J. M. Coulter. (C.)

In 6th Ann. Rep. U. S. Geol. Surv. Terr. (Hayden) p. 747. Washington, 1873.

THE GREAT BASIN REGION.

Catalogue and Description of Plants collected on Stansbury's Expedition to the Great Salt Lake. By John Torrey, M.D., (D.)

In Expl. and Surv. Valley of the Great Salt Lake of Utah by Howard Stansbury, p. 383. Philadelphia, 1852.

Catalogue of Plants collected on an Expedition down the Zuni and Colorado Rivers by Capt. L. Sitgreaves. By John Torrey, M.D. (C.)

In Report of Expedition, p. 155. Washington, 1854.

W. R. G.
N. L. B.

Spiked form of Cypripedium insigne.—This orchid from Nepal, common in cultivation, has usually but a solitary flower on a single scape as in our *C. acaule*. A correspondent sends me one with two flowers. It is evident that the flower is solitary only because of the suppression of the terminal bud in an inflorescence intended to be spicate. Here that bud has overcome retardation and another internode with a flower has been formed. At this second node another

bud has been developed, and from the number of small scales on this bud, it is evident that, under still more favorable conditions, a spike of several flowers might result. It would be worth while to look for similar manifestations in *Cypripedium acaule*. It would further be interesting to attempt to expose the law by which suppression is accomplished in these one-flowered species.

THOMAS MEEHAN.

Mimicry in a Fungus.—We are indebted to the courtesy of the *Scientific American* for the accompanying cut, which illustrates a curious form of *Polyporus lucidus*, Fr., a fungus that not unfre-

quently assumes odd shapes. "Its likeness to a profile view of the Duke of Wellington is striking. It was found growing from the side of a partially decayed hemlock log, with the face side up, which now has the seamed and wrinkled appearance shown in the illustration of the face of the Iron Duke in his later years. The shrunken mouth and lips and the prominent nose are all plainly indicated."

Humulus.—In all botanical works that give the etymons of generic names it is either asserted or suggested that *Humulus* is a derivative from *humus*, 'moist earth,' the allusion being to the plant's

growth in rich soil. Were this the case *Humulus* would mean 'little moist earth,' a nonsensical name to apply to a plant.

Du Cange, in his Glossarium mediæ et infimæ Latinitatis gives the forms *humlo*, *humulo*, *humelo*, *humolo*, *humulus*, and, under one of them, says, "ex Gall. *houblon*, quod a Latino *lupulum* formatum, elisa litera *l*."! This, although pretty bad etymologizing, was good enough for the period at which it was put forth, and is of value as showing that Du Cange considered these low Latin words as borrowed from a living language, as is indeed the case. They are probably, as Skeat (Etymol. Dict.) states, of Teutonic origin (O. Du. *hommell*, O. Norse *humall*, Swed., Dan. and Norweg. *humle*), although similar names for the hop are to be found in the Slavonic dialects, and in Finnic and Tartaric. Other Teutonic names for the hop are: O. H. Ger. *hopfo*, M. H. Ger. *hopfe*, *hoppe*, Ger. *hopfen*, Flem. *hoppe* (whence O. Eng. *hoppe*, Eng. *hop*), Du. *hop*. Skeat would connect these two forms, and derive the latter from the Aryan root *kap*, 'to undulate,' 'bend,' in allusion to the twining nature of the plant, and the former from this same root nasalized—*kamp*.*

W. R. G.

Botanical Notes.

The Coloration of Autumn Leaves.—Mr. H. C. Sorby, who has for several years been studying the subject of the coloration of autumn leaves, gives (in *Nature*) the following conclusions in regard to it.

As a general rule the color of leaves in their normal condition depends on a variable mixture of two perfectly distinct green pigments and of at least four perfectly distinct yellow substances. The development of the autumnal tints is mainly due to the disappearance or change of the green constituents and to the production of highly-colored pigments by the oxidization of previously existing very pale or colorless substances. It is, in fact, due to a more or less complete loss of the vitality which previously counteracted these chemical changes, and the order in which the tints are developed can be easily explained, if we assume that the death of the leaves takes place somewhat gradually. The first visible effect of the reduced vitality is the change in the green pigments. In many cases they appear to be converted into colorless products, since the resulting bright yellow leaves differ from the normal green in the absence of chlorophyll, and merely contain the usual previously existing yellow pigments. At the same time it is quite possible that an increased quantity of some of these yellow substances may be formed as a product during the change, but of this there is no positive proof. In the case of such trees as the alder, the chlorophyll does not thus dirappear, but is changed by the presence of a weak acid into a very stable brownish-green product which resists further change. The production of bright yellows or dull browns thus clearly depends on whether the chlorophyll does or does not disappear before being modified by the action of acids, as may be verified experimentally by exposing suitable

* It is well to note here, however, that Nemnich (Allgemeines Polyglotten Lexicon der Natur-geschichte) gives *hymel* as the Persian name of the plant.

solutions to sunlight. It is, however, very clear that the manner in which it changes depends very much on the conditions of the case. Thus, if chlorophyll is exposed to sunlight dissolved in bisulphide of carbon, a reddish-colored product is formed, and, though this differs very greatly from the red pigment met with in many autumnal leaves, it seems probable that under some conditions the chlorophyll in leaves is changed by the action of light into a red substance. By taking green sorrel leaves and keeping them somewhat fresh by sticking the stalks into moist ground, I found that those exposed to the sun with the under side upwards turned to a bright red, whereas those kept in the shade did not develop any fine coloring. We may often see that partially broken leaves or twigs undergo this change when all other parts of the tree remain green, and this and various other facts lead me to conclude that the change of chlorophyll into a red product depends on a certain amount of reduced vitality as well as on little-understood conditions varying in different kinds of plants. Though I fully admit that there are some facts not easy to understand, yet on the whole it seems to me that these principles fairly well explain why certain leaves turn red in autumn. Slight frosts reduce their vitality in such a manner that the chlorophyll is changed by the action of the light into a red product. Thus, according to the character of the season and the nature of the plants, the first effect of the reduced vitality in the leaves is that the chlorophyll is removed so as to show their normal yellow color, or is changed into a red pigment, or is altered into a comparitively stable dull brown-green product. These are the three extreme changes, but in many cases intermediate mixed results give rise to such less perfect and well-marked tints as dirty yellows and reds.

The next series of changes is best studied in the case of those leaves which in the first instance turn to a bright yellow, and it appears to me that they depend mainly, if not entirely, on the production of deeply-colored pigments by the oxidization of tannic acid and other more or less colorless substances. The difference in the resulting tint seems to depend on the nature these substances. Thus, for exemple, the tannic acid in the yellow oak leaves changes into a brown substance, whereas the quinotannic acid in yellow beech leaves changes into the fine orange-brown color which makes those trees so ornamental in autumn. On the contrary, the bright yellow poplar leaves rapidly pass to a dark dirty brown by the alteration of another constituent. Other kinds of leaves give rise to tints of an intermediate and less well marked character. In many cases it is almost impossible to draw the line between the color of this stage in the change and the final dark and dirty browns of dead and decaying leaves. For fine effect very much depends upon the production of each special tint in a fairly pure state, so as to show bright yellows, reds and browns. This seems to be influenced by the character of the weather. It is also, of course, important that the half dead leaves should hang long on the trees, so as to develop their full coloring before being blown off by the wind.

Taking thus all the facts into consideration, it appears clear that all the bright and beautiful tints of autumn are merely the earliest

stages of decomposition, and are due to the more or less considerable triumph of chemical forces over the weakened or destroyed vitality of the living plant. One cannot but feel that this is a very unpoetical way in which to regard the magnificent tints of a fine autumnal landscape, but it is no less true than that the colored clouds of evening mark the departing day.

Botanical literature.

Memorial of George Bentham. By Asa Gray. (Reprinted from the *American Journal of Science*, xxix.)

Flora of Southern and Lower California. A Check-list of the Flowering Plants and Ferns. By Chas. R. Orcutt. 8vo., pamph., pp. 13. San Diego, Cal., 1885.

Marine Algæ of San Diego, Cal. By Daniel Cleveland.

Memorial of George Bentham. By Asa Gray. (Reprinted from the *American Journal of Science*, xxix.)

Proceedings of the Torrey Club.—The regular meeting of the Club was held at Columbia College, Tuesday evening, January 13th, 1885. In the absence of the presiding officers, Dr. Britton occupied the chair.

This being the Annual Meeting, officers for the ensuing year were balloted for with the following result: President, J. S. Newberry; Vice President, Addison Brown; Treasurer, W. H. Rudkin; Recording Secretary, Arthur Hollick; Corresponding Secretary, Miss Maria O. Steele; Editor, W. R. Gerard; Associate Editor, Benj. Braman; Curator, Miss E. G. Knight; Librarian N. L. Britton.

Miss Knight announced that she had recently detected *Azolla Caroliniana* growing luxuriantly in the water-lily tanks of a greenhouse on Staten Island.

Dr. Britton exhibited specimens of *Dioclea Boykinii* lately collected in Arkansas by Prof. F. L. Harvey, and also a new species of *Cyperus* (described in the January BULLETIN) from S. Arizona.

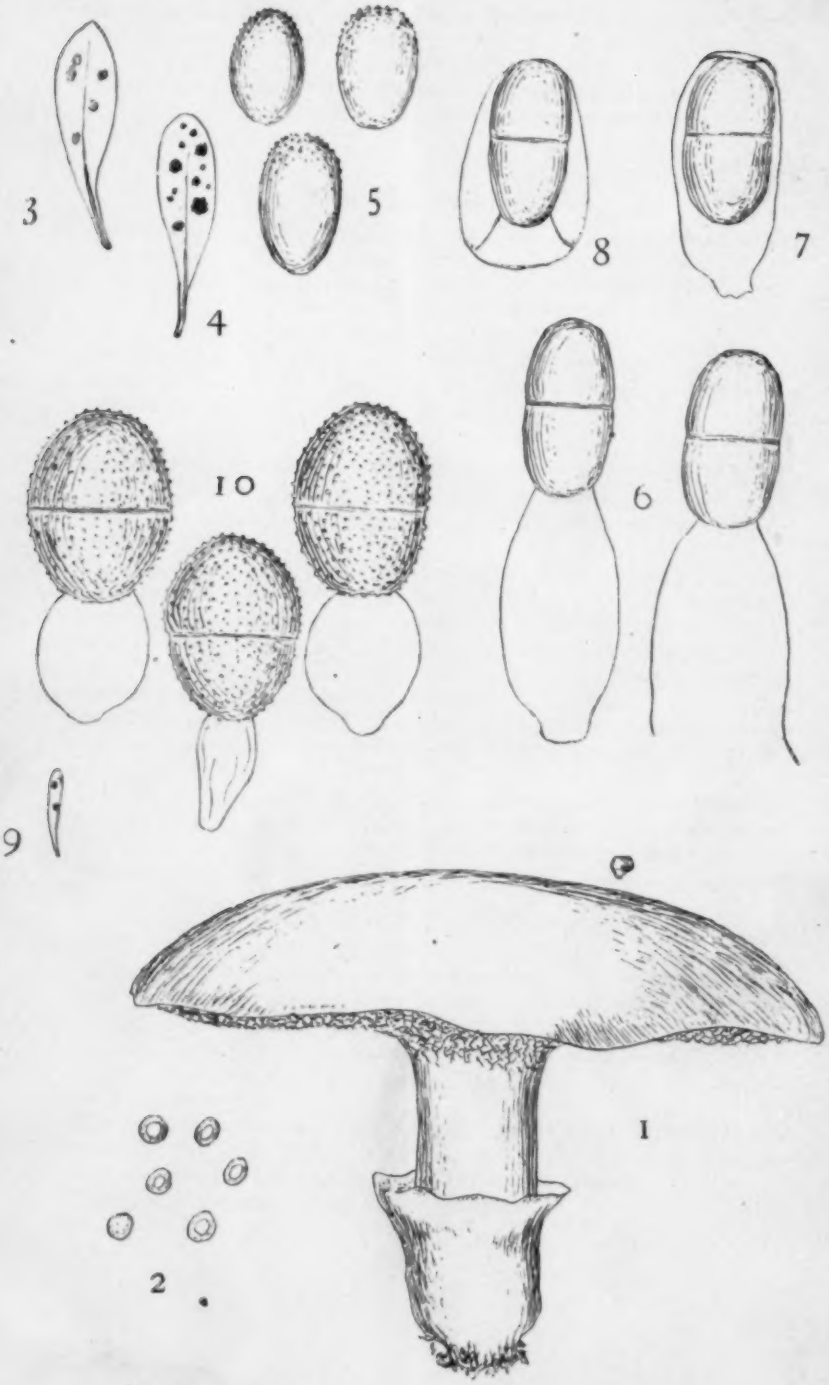
Mr. Schrenk read a paper upon the structure of *Limnanthemum lacunosum*, (see page 13.)

At the regular meeting of the Club, Tuesday evening, Feb. 10th, the chair was occupied by Dr. Britton in the absence of the presiding officers, and sixteen persons were present.

The chairman gave a brief account of the difference between *Stellaria longifolia* and *S. graminea*. The latter has often been mistaken for a variety of the former and appears to be spreading. Specimens were shown from localities on Long Island, Staten Island and the Newark Mountains.

Mr. Schrenk remarked upon the presence of peculiar hairs in the intercellular canals of *Brasenia peltata*, and which are quite different from those found in *Nymphæa* and other aquatic plants.

Two persons were elected active members.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BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XII.] New York, April, 1885. [No. 4.

New Species of Fungi.

By CHAS. H. PECK.

(Plate XLIX.)

BOLETUS SPHÆROSPORUS. (Figs. 1 and 2).—Pileus glabrous, viscid, reddish brown or chestnut-colored, 3 to 4 inches broad; tubes large, angular, adnate or slightly decurrent; stem short, about 1.5 in. long, bearing near the base a thick, well-developed, volva-like annulus; spores globose or broadly elliptical, generally uninucleate; .0003 to .00035 in. long.

Wisconsin. Prof. W. Trelease.

The specific characters here given are derived from a single dried specimen of the fungus. Prof. Trelease informs me that one of the students of the University collected two specimens of the plant, but no notes concerning it were preserved. Consequently its colors and some of its characters in the fresh state cannot now be accurately given. Ordinarily I should not feel justified in attempting to describe a species under such circumstances and from so scanty material, but this species is evidently so remarkable and so distinct in two of its characters that it seems worthy of some notice. The first and most notable character is found at the base of the stem. I have called it a volva-like annulus. It appears in the dried specimen very much as if it were a real volva, whose ruptured, spreading margin forms a cup-like annulus. Still, it may be only a thick peronate or sheathing veil, and as such I prefer to consider it, though it is unlike that of any other species of *Boletus* known to me. The other noticeable character is found in the spores. These are almost globular, while in other *Boleti* they are generally fusiform or oblong-fusiform. Such a departure from the usual form is the chief distinguishing character of the genus *Strobilomyces*, Berk., and it is also given as the most available means of distinguishing *Paxillus porosus* from species of *Boleti*. Fries did not consider such a variation in the spore-character a sufficient ground for the removal of a species from the genus *Boletus*, but, when combined with such an annulus as we have in this species, the two together seem to be of greater importance and may yet render the formation of another genus desirable. It is to be hoped that the young plant may be observed and the real nature of our supposed veil or annulus be ascertained. Should it prove to be a volva it would indicate a most interesting parallelism between the genera *Boletus* and *Agaricus*.

SEPTORIA ASTRAGALICOLA.—Spots indefinite or obsolete; perithecia hypophyllous, lenticular, .005 to .007 in. broad, black; spores

subcylindrical, straight or but slightly curved, obtuse, .0016 to .0025 in. long, .0002 to .00025 broad, sometimes plurinucleate, oozing out and forming whitish or faintly pinkish masses or tendrils.

On living or languishing leaves of *Astragalus*. Arizona. August. M. E. Jones.

The affected leaves turn yellowish. The spores are generally cylindrical, but sometimes they are slightly narrowed toward one end, and occasionally one appears to be obscurely septate in the inside. The species is distinct from *S. Astragali* both in the situation of the perithecia and in the character of the spots.

PUCCINIA TUMIDIPES. (Figs. 3 to 8.)—I. Not seen.

II. Sori small, amphigenous, surrounded by the ruptured epidermis, reddish brown or rubiginous; stylospores ovate elliptical or oblong-ovate, rough at one end, .0014 to .0016 in. long, .001 to .0011 broad.

III. Spots none; sori amphigenous, unequal, obliterating the remains of the ruptured epidermis, black; teleutospores elliptical or oblong elliptical, not at all or but slightly constricted at the septum, .002 to .0025 in. long, .0011 to .0014 broad, supported on an inflated hyaline pedicel, which is generally a little longer and broader than the spore itself.

On living leaves of *Lycium Andersonii*. Arizona. September. M. E. Jones.

The two kinds of sori sometimes occur on separate leaves; sometimes they are intermingled on the same leaf and the stylospores and teleutospores are occasionally intermingled in the same sorus. The species is remarkable for the enlarged, membranous, hyaline pedicels. When the spores and their pedicels are moistened they fall over, the one upon the other, and lie side by side, thus appearing to possess a sort of hygrometric character.

PUCCINIA GLOBOSIPES. (Figs. 9 to 10).—Spots none; sori small, rotund, prominent, black; teleutospores broadly elliptical, rough, not constricted, opaque, .002 to .0027 in. long, .0016 to .002 broad; pedicel subglobose, inflated, hyaline, equal to or a little smaller than the spore itself.

On leaves of *Lycium Californicum*. California. M. E. Jones.

This species, by its inflated vesicle-like pedicel, is related to the preceding one, but is clearly distinct from it by its broader, rough or verrucose spores and their more globose pedicels. I have not seen the æcidial and uredo forms, and the sori of the teleutospores are very scarce in the specimens sent. *P. Lycii*, K., whose host-plant is *Lycium tubulosum*, has much smaller spores, and the description does not indicate that they possess an inflated pedicel.

PUCCINIA BRICKELLIÆ.—I. Not seen.

II. Spots none; sori clustered, often concentrically arranged, at first covered by the epidermis, then surrounded by its ruptured remains, reddish brown; stylospores subglobose, broadly ovate or oblong-ovate, generally uninucleate, .0012 to .0016 in. long, .0009 to .001 broad.

III. Sori as in the uredo-form; teleutospores intermingled with the styiospores, elliptical or oblong-elliptical, not at all or but slightly

constricted at the septum, .002 to .0025 in. long, .0014 to .0016 broad ; pedicels equalling or exceeding the spores in length.

On living leaves of *Brickellia*. Arizona. September. M. E. Jones.

PUCCINIA PENTSTEMONIS.—Spots none ; sori amphigenous, unequal in size, prominent, black ; teleutospores elliptical or oblong-elliptical, .0012 to .002 in. long, .0008 to .0011 broad ; pedicel hyaline, generally much longer than the spore.

Living leaves of *Pentstemon linarioides*. Arizona. September. M. E. Jones.

Æcidial and uredo-forms not present. Whether *Æcidium Pentstemonis*, Schw., belongs to this *Puccinia* is uncertain.

PUCCINIA MALVASTRI.—Spots obliterated ; sori clustered, confluent, amphigenous, dark reddish brown, compact, prominent ; spores oblong-elliptical, scarcely constricted, even, obtuse or rarely obtusely pointed, .0019 to .0025 in. long, .0009 to .0012 broad ; the pedicel longer than the spore, generally two to four times its length, hyaline.

On living leaves of *Malvastrum*. Arizona. September, M. E. Jones.

This differs from *P. Malvacearum*, of which I was at first inclined to believe it a variety, in its different habit, darker colored sori, comparatively broader spores and generally longer pedicels.

PUCCINIA VIGUIERÆ.—Sori numerous, prominent, amphigenous, blackish brown; spores oval or broadly elliptical, obtuse, slightly constricted at the septum, .0016 to .002 in. long, .0011 to .0012 broad, with a hyaline pedicel longer than the spore.

Leaves of *Viguiera*. New Mexico. April. M. E. Jones.

The species is closely related to *P. Helianthi*, Schw., and *P. variolans*, Hark., from both of which it is distinguished by its broader spores.

UROMYCES SOPHORÆ.—Sori numerous, small, amphigenous, reddish brown; spores subelliptical, nearly even, .0011 to .0014 in. long, .00065 to .0008 broad, the epispore thickened at the apex, the pedicel shorter than the spore.

Living leaves of *Sophora sericea*. New Mexico. October. M. E. Jones.

The sori are thickly scattered over both surfaces of the leaves. The species is closely related to *U. apiculatus*.

USTILAGO ARISTIDÆ.—Spores small, .0003 to .00035 in. in diameter, subglobose, more or less angular, even, black, occupying the whole interior of the seed.

Spikelets of *Aristida*. El Paso, Texas. September. M. E. Jones.

Every seed in the panicles sent me is affected by the fungus. The seeds do not appear to be much enlarged, but the whole interior is transformed to a dusty mass of spores enclosed by the thin external shell or membrane. The species is apparently related to the South American *U. Lorentziana*, Thum., and the African *U. Penniseti*, Rabh., but is easily distinguished from both of these by its more angular spores.

UREDO JONESII.—Sori hypophyllous, numerous, orbicular, compact, bright orange, surrounded by the ruptured epidermis; spores subglobose, rough, .0009 to .00011 in. broad, orange yellow fading to whitish.

Living leaves of *Ribes*. New Mexico. October. M. E. Jones.

The sori occupy the whole lower surface of the leaf and by their bright color give it a beautiful appearance.

EXPLANATION OF PLATE, XLIX.—*Boletus sphærosporus*, Peck. Fig. 1. Lateral view of a plant. Fig. 2. Six spores x 400. *Puccinia tumidipes*, Peck. Fig. 3. A leaf bearing five sori of the uredo-form. Fig. 4. A leaf bearing sori of the teleutospores. Fig. 5. Three uredo-spores x 400. Fig. 6. Two teleutospores in erect position x 400. Fig. 7. A teleutospore recumbent on its pedicel, the apex directed downward, x 400. Fig. 8. A teleutospore in similar position, but the apex directed upward x 400. *Puccinia globosipes*, Peck. Fig. 9. A leaf bearing two sori. Fig. 10. Three teleutospores x 400.

Contributions toward a List of the State and Local Floras of the United States.*

Catalogue of Plants collected during the Exploration of the Colorado River of the West by Lieut. J. C. Ives in 1857–58. By Drs. Gray, Torrey, Thurber and Engelmann. (C.)

In Report of Expedition, part iv. Washington, 1861.

Description of the Species constituting the Botany of the Basin of the Great Salt Lake of Utah, as far as it is known. By E. Durand. (C.)

In Trans. Amer. Philos. Soc. Vol. xi., n. ser., 1860.

A Catalogue of Plants collected in 1872 in Utah, Wyoming, etc. By J. M. Coulter. (B.)

In U. S. Geol. Surv. Montana, Idaho, Wyoming and Utah, 1872, p. 758. Washington, 1873.

Botanical Observations in Western Wyoming. By C. C. Parry, M.D. In Amer. Nat. viii., pp. 9, 102, 175, 211. (B.)

Botanical Observations in Southern Utah. By C. C. Parry, M.D. In Amer. Nat. ix., pp. 14, 139, 199, 267, 346. (B.)

Catalogue of Plants collected in Nevada, Utah, Colorado, New Mexico and Arizona with Descriptions of those not contained in Gray's Manual of the Northern United States and Vol. v., Geol. Expl. of the 40th Parallel. By J. T. Rothrock and others. (C.)

In U. S. Geol. Surv. West of 100th Meridian, Vol. vi. 4to. Washington, 1878.

Catalogue of Plants collected in the years 1871, 1872 and 1873 with Descriptions of New Species. (Nevada, Utah, Arizona.) By S. Watson and J. T. Rothrock. (C.)

In U. S. Geog. and Geol. Expl. and Surv. West of the 100th Meridian, 8vo., pamphlet, Washington, 1874.

Plants collected during Capt. J. H. Simpson's Explorations across the Great Basin of the Territory of Utah. By George Engelmann. (C.)

In Rep. of Explorations, Appendix M. Washington, 1876.

W. R. G.
N. L. B.

*Continued from page 28.

Reliquiæ Rafinesquianæ.—It may be of interest to put on record, as an appendix to Dr. Gray's exhaustive account of Rafinesque and his writings,* the fact that there exists in the library of the New York Academy of Science, bound up in a volume of "Botanical Tracts" (Vol. C), a collection of 29 copper-plate engravings illustrating Rafinesque's "Select New Plants of North America." On the lower margin of the first plate is written in ink: "The following plates are the proofs of plates lost in my shipwreck of 1815," and on the reverse of the same plate is written in the same hand: "Collection of 29 Plates and 46 Figures of New Genera and Species of Plants, from North America, discovered by C. S. Rafinesque in 1802–4. Published in 1807, 1808 and 1814. These Plates never published—only Proofs of Plates lost 1815, thus they are a unique collection. Deposited in the Lyceum at the foundation in 1817, by the author. N. B. The Phyllepidium alone was published in the Encycl. Journal of Sicily."

I give the inscription *verbatim et literatim.* The plates are of two different sizes, and illustrate new genera and species of both flowering-plants and fungi. The figures of phænogamous plants, although not very artistic, were probably copied from nature, and are as follows (the names in parenthesis being the author's corrections and notes in ink): *Burshia* (*Purshia*) *humilis, Gerardia maritima, Drosera filiformis, Diphryllum bifolium, Carpanthus axillaris, Asclepias lutea, Viburnum villosum, Arenaria imbricata* (Raf. 1802. *A. squarrosa*, Michx., 1803), *Ranunculus obtusiusculus, Phyllepidium squarrosum, Ludwigia hirtella, Arethusa medeoloides* (*Odonectis verticillata*), *Isotria verticillata, Chironia amœna* (*Sabbatia stellaris*, Pursh.). The fungi represented are as follows: *Volvaria coccinea* (*Volvycium coccineum*), *Hydnum barbatum, H. cerulescens, H. citrinum, H. dilatatum, Clavaria citrina-fusca, C. bicolor, C. dryophylla, C. tricolor, Acinophora aurantiaca, Phorima betutina, Druparia volvacea, Peziza albo-rufa, P. globulosa, P. lupularia, P. smiraldina, P. pulcherrima, P. depressa, P. ochro-chlora, Cerophora clavata, C. globularis, C. capitata, C. dichotoma, C. ramosa, C. pyriformis, Astrycum multifidum, A. dimidiatum, Dicarphus rubens, Ædycia alba, Colonnaria urceolata*, and *C. truncata.* Most of these figures of fungi seem to have been drawn from memory—possibly from imagination, and all are quite rudely executed. Those relating to known genera bear only a remote resemblance to the objects that they were designed to illustrate, and not one could possibly be of aid in the determination of a species. In the March, 1880, number of the BULLETIN I suggested that, from Rafinesque's brief diagnosis, his genus *Ædycia* may have been what is now known as *Corynites*, and that his *Colonnaria* was probably the same thing as the at present recognized genus *Laternea*—his two species being merely accidental varieties of what Bosc before him had named *Clathrus* (*Laternea*) *columnatus.* A reference to the plate, however, in which is figured an improbable fungus under the name of *Ædycia alba*, at once dispels any illusion that we might possess as to the identity of the latter with *Corynites.* The object looks not unlike a

American Journal of Science and Arts. Vol. xl., No. 2.

swollen root of some tree or shrub which has been sawed off at one end and broken off (so as to be ragged and fibrous) at the other. As for the figures of *Colonnaria*, they bear a general resemblance to *Laternea columnata*, in that they have a receptacle composed of four branches united at the top and base; but here the analogy ends, for *C. truncata* is surmounted by a perfectly square, sharp-cornered, open box, full as wide as the lower extremity of the fungus, and the edge of which is decorated with what looks like a cylindrical molding. The other species, *C. urceolata*, has somewhat the same habit, but differs in the substitution of a wide circular ring or collar for the "box"—its edge likewise being finished off with the ornamental molding. The species of neither of the genera are provided with a volva, and both of those of the last-mentioned genus remind me very strongly of certain quaint objects which I have seen in collections of Japanese ceramics. I venture to say that no so absurd fungi as these ever were, or ever will be, found on the face of the earth.

The small collection of plates is perhaps of interest in connection with the bibliography of American botany, and as unique relics of one of its earliest, as well as one of its most eccentric students. The figures of flowering-plants may be of use in helping to elucidate the author's vague descriptions, but the plates of fungi will only serve to show what a useless mass of rubbish would certainly have been inflicted upon mycological science had not the fortunate shipwreck of 1815 supervened.

W. R. G.

Flora of Richmond Co., N. Y.—Additions, corrections and new localities, 1883–1884.

Delphinium Consolida, L.—Roadsides near Richmond.

Adonis autumnalis, L.—Stapleton Flats; introduced in ballast. (Miss C. O. Thompson.)

Thlaspi arvense, L.—Clove Lake.

Reseda odorata, L.—"Waste places, S. I., 1865;" (Wm. H. Leggett.) Mr. Samuel Henshaw, also, states that he knew of one plant which had grown and flourished for several successive years in the crevice of a stone wall in Stapleton.

Viola pubescens, Ait., var. *eriocarpa*, Nutt. Near Barrett's Dye Works, Port Richmond.

Ascyrum Crux-Andreæ, L.—Richmond Valley and Tottenville.

Vaccaria vulgaris, Host.—Stapleton Flats; introduced in ballast. (Miss C. O. Thompson.)

Silene nocturna, L.—Stapleton Flats; introduced in ballast. (Miss C. O. Thompson.)

Stellaria graminea, L. Tottenville, Four Corners, New Brighton and New Springville. Appears to be spreading and is much less rare than formerly. (Replaces *S. borealis*, Bigel., of our catalogue.)

Vicia hirsuta, Koch.—New Brighton. Rare.

Vitis cordifolia, Mchx, var. *riparia*, Gr.—Garretsons.

Cytissus triflorus, L'Her. Todt Hill; escaped from cultivation.

Prunus Americana, Marshall. Abundant in a limited locality near the Moravian Cemetery.

Rubus laciniatus, Willd.—Silver Lake; escaped from cultivation.

Pyrus arbutifolia, L., var. *erythrocarpa*, Gr.—Common.

Pyrus arbutifolia, L., var. *melanocarpa*, Gr.—Common. (This and the preceding variety should replace *P. arbutifolia*, L., in our catalogue.)

Lonicera Japonica, Thunb.—Woods and roadsides near Four Corners and Richmond. Rapidly spreading, from pieces thrown out of gardens.

Viburnum Lentago, L.—Clove Lake Swamp.

Galium trifidum, L., var. *latifolium*, Torr.—"Clifton, S. I., 1870." (Wm. H. Leggett.)

Galium verum, L.—Stapleton Flats and New Brighton. (Miss C. O. Thompson.)

Galium Mollugo, L.—New Brighton. (Miss C. O. Thompson.)

Asperula arvensis, L.—Stapleton; introduced in ballast. (Miss C. O. Thompson.)

Aster multiflorus, Ait.—Abundant on the salt marshes near Green Ridge.

Aster Novæ-Angliæ, L., var. *roseus*, Gr.—Port Richmond and West New Brighton.

Solidago Canadensis, L., var. *scabra*, T. & G.—Tottenville.

Eclipta alba, Hassk.—Beginning to spread in waste places and gardens. (*E. procumbens*, Michx., of our catalogue.)

Chrysanthemum Parthenium, Pers.—"Rubbish heaps, S. I. 1869." (Wm. H. Leggett.) New Brighton. (Miss C. O. Thompson.)

Centaurea solstitialis, L.—Stapleton Flats; introduced in ballast. (Miss C. O. Thompson.) "Stapleton, S. I., 1870." (Wm. H. Leggett.) (Replaces *C. Militensis*, L., of our catalogue.)

Leontodon autumnale, L.—New Brighton. (Dr. F. Hollick.)

Mulgedium Floridanum, D. C. Todt Hill.

Gaultheria procumbens, L.—Watchogue. (E. M. Eadie.)

Campanula rapunculoides, L.—Roadsides, Richmond Valley.

Primula veris, L.—"Roadside, West New Brighton, 1879." (G. M. Wilber.)

Paulownia imperialis, Sieb. and Zucc.—Silver Lake; spreading quite extensively.

Trichostema lineare, Nutt. Tottenville.

Pycnanthemum Torreyi, Benth. "Richmond Valley, 1864." (Wm. H. Leggett.)

Monarda didyma, L. Willow Brook; escaped from gardens.

Physostegia Virginiana, Benth. "Staten Island, 1861." (Wm. H. Leggett.)

Marrubium vulgare, L.—Watchogue. (E. M. Eadie.)

Echium vulgare, L.—Kreischerville. (Wm. T. Davis.)

Asperugo procumbens, L. Stapleton Flats; introduced in ballast. (Miss C. O. Thompson.)

Ipomœa Nil, Roth.—New Brighton. Rare.

Nicandra physaloides, Gærtn,—Abundant at Tottenville.

Sabbatia chloroides, Pursh.—Chelsea. (E. M. Eadie.)

Gentiana Saponaria, L. Tottenville.

Asclepias variegata, L. Tottenville. (Wm. H. Rudkin.)

Atriplex rosea, L.—Waste places, Clifton.

Polygonum incarnatum, Ell.—New Brighton. (Miss C. O. Thompson.) Not, as first supposed, common.

Rumex pulcher, L.—Stapleton Flats; introduced in ballast. (Miss C. O. Thompson.)

Ulmus fulva, Michx.—Egbertville.

Quercus bicolor. Willd.—Green Ridge and Egbertville.

Quercus prinoides, Willd.—Watchogue.

Betula nigra, L.—A few trees near Bull's Head.

Sparganium simplex, Huds., var *Nuttallii*, Engelm.—"Tottenville, 1871." (Wm. H. Leggett.)

Potamogeton pulcher, Tuck.—Silver Lake.

Potamogeton amplifolius, Tuck.—Clove Lake.

Sagittaria variabilis, Engelm., var. *obtusa*, Gr.—Common.

Sagittaria variabilis, Engelm., var. *hastata*, Gr.—Common. (These varieties should replace *S. variabilis*, Engelm., in our catalogue.)

Habenaria ciliaris, R. Br.—Watchogue. (E. M. Eadie.)

Smilax Pseudo-China, L.—Linden Park Swamp.

Juncus dichotomus, Ell.—"Tottenville, 1871." (Wm. H. Leggett.)

Heleocharis prolifera, Torr. (?)—Found only in one clear deep spring, at Port Richmond. Has never been found in fruit, and hence the determination may prove to be wrong.

Heleocharis olivacea, Torr.—"Tottenville." (Wm. H. Leggett.)

Scleria triglomerata, Michx.—Linden Park.

Carex rosea, Schk., var. *radiata*, Desv.—"Huguenot, 1871." (Wm. H. Leggett.)

Carex Muhlenbergii, Schk., var. *enervis*, Boot.—New Dorp and Garretsons.

Carex debilis, Michx.—"Rossville, 1869." (Wm. H. Leggett.)

Eragrostis pœoides, Beauv.—Streets of Port Richmond.

Eragrostis Purshii, Schrader.—New Brighton and Court House.

Phalaris Canariensis, L.—New Dorp and New Brighton.

Isoetes echinospora, Durieu, var. *Braunii*, Engelm. (?)—Only one specimen, found near Huguenot; not in fruit, the determination may therefore not be correct.

N. L. Britton.
Arthur Hollick.

A new Locality for Nelumbium.—In a swamp a few miles to the west of Osterville, Mass., a village on the southern side of Cape Cod, *Nelumbium luteum*, Wild., grows more or less abundantly. Probably this is the most eastern locality of the species. One cannot say whether it originally grew here, because the swamp is near the reservation of the Marshpee Indians and it is quite possible that the *Nelumbium* was introduced by them. The swamp is visited by summer visitors at Osterville, but the existence of the *Nelumbium* so far east was, as far as I can ascertain, unsuspected by our botanists. The existence of a patch of *Genista tinctoria*, L., in the heart of Cambridge, and close to one of the dormitories occupied by Harvard

students, surprised me very much until, about three years ago, in passing Felton Hall I noticed a vacant lot close by covered with a mass of yellow bloom. Except near Salem, the plant is rarely seen in Eastern Massachusetts.

W. G. FARLOW.

Botanical Notes.

On Derivation in Pinus edulis and Pinus monophylla.—At a meeting of the Botanical Section of the Philadelphia Academy of Natural Sciences on December 8th, Mr. Thomas Meehan called attention to some dried specimens of *Pinus monophylla* on the table, which were received in a fresh condition, a few months ago, from Mrs. Lewers, of Franktown, Nevada. At that time the phyllodes which took the place of the real leaves were all monophyllous. In drying, several had opened in some specimens, and others readily separated by a little aid, showing that the species might have been two-leaved but for some inability in the early stages of development to separate them. This monophyllous species was closely allied to *Pinus edulis*, which was confined to the Rocky Mountains, the monophyllous species being the form that prevailed further west. But in a small tree of *P. edulis* growing in a deep ravine in Queen Cañon, in the Rocky Mountains he had on the same tree found monophyllous, diphyllous, and triphyllous phyllodes, and there could not possibly be any doubt that the species were of one origin. The case was one worthy of note, because it had been charged that there was no actual evidence of the truth of the doctrine of derivation. Generally, when such evidences as these were offered, the objector was prepared to abandon his belief in the specific distinctness of the forms rather than to grant that two distinct species had been developed from one parent, and even in the case of these species there were some who regarded one as but a variety of the other. But there were other distinctions: The cones were not quite the same, and the seeds were very different in size and outline, so that one could readily separate the seeds if mixed together. There was, in fact, a whole series of distinctions fully as great as we could find in many well-recognized species, and which fully entitled the two forms to full specific rank, though in the face of the evident facts that they are derivations of one original parentage. Indeed, it was well known that when a plant changed its character in one respect it must do so in others; plants in some climates annual would become perennial or suffrutescent in others. The cotton-plant was a familiar example. In such cases the foliage and other characters varied from those connected with the annual form, and from this fact some botanists had regarded *Gossypium herbaceum* and *Gossypium arboreum* as distinct species. In the case of these two species of *Pinus*, the one which could not develop its phyllodes with two separate individuals would of necessity present some peculiarities in the scales of the cone, as these were, morphologically, but transformed phyllodes. Under morphological laws, that which affected the leaves ought to affect the carpels or other parts of fructification which were modified from them.

The true position of the species in development was that *Pinus*

edulis had the highest rank. In raising both species from seed there was no difference whatever between the seedlings during the first season. In these young and delicate plants, true leaves were perfectly developed; these were flat, linear lanceolate, and of a deep glaucous hue. *Pinus edulis* assumed stout, vigorous branches the second year; then the true leaves were suppressed, a portion only being adnate with the stem, forming a sort of cushion, or as bud-scales, or bracts under the scales of the cone, from the axis of which the phyllodes—secondary leaves, or bundles of leaves of some authors—spring. In *Pinus monophylla* only a few branches made phyllodes the second year, and, from the seed, he had plants ten years old, which continued to bear branches with true leaves almost equally with those bearing phyllodia. The monophyllous branches were never as strong as those from *Pinus edulis*, and in ten years a plant of *Pinus edulis* would be double the size of *Pinus monophylla*. Assuming, as we may, that the two had one parentage, we see that the one had less vigor of growth; it retained more of its juvenile characteristics, and retained them longer than the other; and it never reached the power of development that *Pinus edulis* had attained. We may say, with confidence, that *Pinus monophylla* sprung from the same parentage as *Pinus edulis*, and became permanently different throughout, being subjected to conditions unfavorable to a full development. It would appear that the soil and climate of Nevada were not favorable to the usual development of *Pinus edulis*, and hence, through the long course of ages, the suppressed features that characterized full maturity in the original, became, under the law of heredity, permanent ones.

It was not often that we had so clear evidence of the unity of origin in two certainly distinct species, and, as supporting the modern ideas of evolution, the case was worthy of being placed on record.

Apospory in Ferns.—W. T. T. Dyer calls attention in *Nature* to a paper by Mr. E. T. Druery (not yet published) as containing a report of one of the most interesting botanical observations that has been made for some time.

Mr. Druery's paper relates to a singular mode of reproduction in *Athyrium Fllix-fœmina*, var. *clarissima*. In this fern the sporangia do not follow their ordinary course of development, but, assuming a more vegetative character, develop more or less well-defined prothallia, which ultimately bear archegonia and antheridia. From these adventitious prothallia the production of seedling ferns of a new generation has been observed to take place in a perfectly normal way.

Mr. F. O. Bauer has confirmed Mr. Druery's observations and obtained from him specimens of another fern (*Polystichum angulare*, var. *palcherrima*) which altogether eclipses the *Athyrium*, remarkable as that is. In the *Polystichum* the apex of the pinnules grows out into an irregular prothallium, upon which was demonstrated the existence of characteristic archegonia and antherida. In this case the production of the prothallium is not even associated locally with the sporangia, but appears as a direct vegetative outgrowth of the normal spore-bearing plant. The oophore is a mere vegetative process of the sporophore, a suppression of the alternation of the two generations which exceeds even that which obtains in the flowering-plant.

Mr. Druery's discovery is the direct converse of the apogamy in ferns, discovered by Farlow. In this the sporophore is a vegetative outgrowth from the oophore. The parallel phenomena in the life-history of the moss have been known for some time. The obvious possibilities of discovery with regard to the reproduction of ferns may now be regarded as exhausted. It may be interesting to give the dates of the different steps:

1597	Gerard	Observed seedling plants near parents.
1648	Cæsius	Sporangia.
1669	Cole	Spores.
1686	Ray	Hygroscopic movements of sporangia.
1715	Morison	Raised seedlings from spores.
1788	Ehrhart	Prothallium.
1789	Lindsay	Germination of spores.
1827	Kaulfuss	Development of prothallium.
1844	Nägeli	Antheridia.
1846	Suminski	Archegonia.
1874	Farlow	Apogamy.
1884	Druery	Apospory.

—*Journ. Royal Micros. Society.*

The Life History of the Lycopodiaceæ, at least so far as regards the development of the prothallium from the spores, has until quite recently been almost unknown. Dr. Treub, however, has recently published in the Annals of the Botanic Garden of Buitenzorg, Java (Vol. iv., pp. 107, 138), a description of the prothallium of *Lycopodium cernuum*. This, according to an extract from the above paper published in *Nature* by Mr. W. T. T. Dyer, consists of a sort of short cylindrical axis, half immersed in the soil at one end, where it is furnished with root-hairs. The upper extremity bears a tuft of small leaf-like lobes. The archegonia and antheridia are found on the upper part of the cylindrical axis, forming a kind of ring or crown near the tuft of lobes.

Botanical Literature.

American Medicinal Plants. An illustrated and descriptive Guide to the American Plants used as Homœopathic Remedies; their History, Preparation, Chemistry and Physiological Effects. By Chas. F. Millspaugh, M.D. New York and Philadelphia: Bœricke & Tafel. Nos. 1 to 5.

This is the first installment of a work which is to contain one hundred and eighty illustrations and descriptions of such native and naturalized plants as are used in homœopathic practice. Dr. Millspaugh has the advantage of being a skilful artist as well as a physician, and has thus been enabled to illustrate his work with figures drawn *in situ* by his own hand. The plates are reproduced in colors from the author's drawings, and the plants represented are in all cases quite true to nature.

The text accompanying each plate gives the systematic name, synonyms, popular name or names and minute description of the plant represented, the part used in homœopathic practice, and mode of preparation, chemical constituents and physiological action.

With the concluding part will be given a glossary of botanical

terms and a complete index, together with a carefully arranged bibliography.

The work, when completed, will form a very beautiful volume—an ornament to the library of any physician.

Contributions to American Botany. XII. By Sereno Watson. From the Proceedings of the American Academy of Arts and Sciences. 8vo., pp. 55.

This twelfth contribution of Mr. Watson's embraces two papers, one devoted to a history and revision of the roses of North America, and the other to descriptions of some new species of plants chiefly from the western Territories.

The author recognizes 18 species of roses as indigenous to North America: *Rosa aciculariś*, Lindl., *R. blanda*, Ait., *R. Sayi*, Schwein., *R. Arkansana*, Porter, *R. Nutkana*, Presl, *R. pisocarpa*, Gray, *R. Californica*, Cham. & Schlecht., *R. Fendleri*, Crepin, *R. Woodsii*, Lindl., *R. minutifolia*, Engelm., *R. Carolina*, L., *R. lucida*, Ehrh., *R. humilis*, Marsh., *R. nitida*, Willd., *R. foliolosa*, Nutt., *R. Mexicana*, Watson, *R. setigera*, Michx., and *R. gymnocarpa*, Nutt. This paper is preceded by an exhaustive and exceedingly interesting historical account of our wild roses.

The second paper contains descriptions of 81 new species and one new genus the latter by Dr. Engelmann.

El Guachamaca. Obra escrita de orden del ilustre Americana, General Guzman Blanco, por A. Ernest. Caracas, 1884.

On the Life-History of certain British Heteræcismal Uredines. (The *Ranunculi Æcidia* and *Puccinia Schœleriana.*) By Chas. B. Plowright. From the Quarterly Journal of Microscopical Sciences. 8vo., p. 22.

Proceedings of the Torrey Club.—At the regular meeting held Tuesday evening, March 10th, the President occupied the chair and 21 persons were present.

Mr. Hollick read a list of additions to the flora of Richmond Co., N. Y., with notes and specimens. The original catalogue, by Messrs. Britton and Hollick, in 1879 enumerated 1,050 species. Three appendices issued since then contain respectively 46, 67 and 48 additions, making a total of 1,211 species to date. Many of these can never be duplicated, owing to the localities having been destroyed. The herbarium of the late Wm. H. Leggett contributed many of these, some of which were collected more than twenty years ago, The entire State flora at the present time embraces about 1,800 species, distributed over an area of about 45,000 square miles. Richmond Co., with an area of only 59 square miles, contains two-thirds of this number. About fifty of these were new to the State when found.

A communication from Mr. Frank Tweedy upon the flora of the Yellowstone Region, was read by Dr. Britton, who showed specimens of the plants mentioned. Mr. Schrenk made some remarks upon the structure of pine wood, and referred particularly to the supposed function of the internal lenticular spaces.

One active member was elected.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XII.] New York, May, 1885. [No. 5.

Notes on the Winter Flora of Bermuda.

By J. F. Kemp.

The Bermuda Islands consist of a group situated off the coast of the United States in N. Lat. 32° 14′ 45″, W. Long. 64° 40′ 55″. They are thus on nearly the same parallel of latitude as Charleston, S. C., and the same meridian as Halifax, N. S. As a British military and naval station they are of importance disproportionate to their small extent. Geologically, the formation is a coral island of the atoll type, but the portions above water, and indeed almost all the visible and investigated portions below water, are chiefly of Æolian origin, and have evidently been heaped up precisely as the peninsula of Florida has been pushed seaward. The inhabitable part is entirely on the south and south-western side of the ring, an evident consequence of the prevailing south-west winds. In addition to the more common and extensive soft sand-rock, which is evidently of very recent formation, there is a narrow ridge of hard, almost crystalline limestone, which is not fossiliferous, which appears to be older than the remainder and to have undergone some metamorphic action. It is honeycombed with caves, and bears the most interesting part of the insular flora and the larger portion of those plants which seem to have been introduced by natural as distinguished from artificial means.*

The general aspect of the country is similar to the rolling sand-dunes of Long Island, except that they are worn into perpendicular cliffs along the shore in many places. The coral sand becomes cemented on exposure into a compact rock, contrasting in this respect very strongly with the silicious beaches familiar to us. Above the water line the exposed faces of the cliffs exhibit the stratified structure due to their origin, but, below it, from some influence of the water, they are apparently massive. In the little bays which indent the coast are stretches of beach sand of a rich creamy color, which support a scrubby growth of shrubs back from the water line. The most important chemical constituents of this sand are shown in the first analysis below. It has doubtless been the source of the other soil whose composition is shown in the second, third and fourth analyses. This fills the hollows back from the shore, is of a red color, supports the market gardens, and is the great source of wealth to the inhabitants. It has evidently resulted from the leaching of the coral sand by rains, the soluble lime being removed and the less soluble constituents concentrated.

* Cf. Bulletin 25, U. S. Nat'l. Museum. List of Plants by Governor Lefroy.

	Coral Sand.	Red Soil.	Red Soil.	Red Soil.
Organic matter	3.806.	11.210.	13.00.	14.910.
SiO_2 and sand insol. in HCl.	0.050.	40.127.	31.764.	20.134.
Fe_2O_3	0.050.	12.340.	10.000.	28.54.
Al_2O_3		13.75.	7.35.	22.90.
CaO	52.470.	3.508.	7.84.	3.335.

The omitted components are water, alkalies, magnesia, etc.

As might be expected from their insular position, they need nitrogenous fertilizers, and the gulf-weed which is washed ashore is carefully gathered to supply the deficiency.

The islands are on the eastern edge of the Gulf Stream, by which very naturally the climate is much influenced. The surface temperature of the water averages 70° F. For the last ten years the mean temperature of the air has been 71° F., the dew-point being 64° F. The highest observation in the shade is 90° F., lowest, 48° F., but in the sun the mercury has reached 158°. August is the hottest month, averaging 87°; February the coldest at 55°. The daily range is 6°–8°, annual 32°. During my visit, March 8th to April 2d, it was 60°–65°. To compare with the United States, it may be said that the isothermal of 72° runs across the middle of Florida at Tampa, and, crossing the upper part of the Gulf of Mexico, strikes Texas at Corpus Christi. The rain-fall is large. The average of ten years shows 155 rainy days in 365, and 56 inches. In one 24 hours while I was there over 4 inches fell. But the distribution through the year is very uniform, the wettest and dryest months differing only by 1″.5. By way of comparison, the rain-fall of New York is 40, and so high a rain-fall as this is reached only in the everglades of Florida, about the Mississippi Delta and on the far north-west coast. It would seem therefore that in physical features the islands closely resemble Southern Florida. Bermuda is best known in the "States" by reason of the early vegetables that come hither. Onions and potatoes are the most important, but tomatoes, beets and carrots are raised in abundance. Strange to say, the seed-onions and potatoes come entirely from abroad, as those produced on the islands do not afford palatable vegetables. The seed-onions come from Madeira and Teneriffe, the potatoes from the States. Carrots are much used locally as table-vegetables, and, when boiled, are exceedingly sweet and palatable, lacking entirely the strong taste that in the north makes them best adapted for fodder. Corn is raised in season and is said to be very good. Tomatoes were ripe March 1st, if not earlier. As if to compensate for natural advantages, the vegetables are much exposed to blights of various sorts, the potatoes suffering especially. But notwithstanding these and the small acreage the exports in 1882 were valued at over £80,000, and the amount is probably greater at present.

Of fruits, the chief one that was ripe in March was the banana. The dwarf variety (*Musa Cavendishii*) is most abundant. Oranges are less cultivated than in former years, but are said to be of unusual excellence. The Bermuda lemon has an exceedingly thick rind, but

* Cf. Voyage of the Challenger. Vol. I., p.

the juice is very palatable. Peaches formerly abounded, but have of late been destroyed by an insect. The few trees that I noticed seemed strong, but the fruit, I was told, is invariably destroyed at the core by this pest. Apples and the allied fruits run to wood. Loquots and the avocado pear are abundant. Every garden is provided with several papaw-trees (*Carica papaya*) the clusters of fruit of which, with the tuft of leaves at the summit of a naked trunk, strike a stranger very forcibly. I heard of the recent introduction of grapes, but did not learn with what success.

Strawberries were ripe in March and were very good. Gooseberries, I was told, do well, but that other berries run to wood.

Of trees the most common, useful and noticeable is the Bermuda cedar (*Juniperus Bermudiensis*), which in former times covered the island and was an abundant source of timber for vessels. It is everywhere present now, but probably of smaller size, the larger trees having been cut for timber. The only other noticeable tree growing wild is the palmetto (*Sabal umbraculifera*), which standing, as it does, side by side with the cedar, gives the landscape a curiously mixed character, tropical and temperate zones seeming to be intermingled.

In addition to these, which were probably introduced by natural means, there are trees from all parts of the world. In former years the inhabitants were seafaring, and on their voyages brought back many trees that struck their fancy. These are scattered over the island in gardens and on lawns. There are several screw-pines, making with the cedar the only conifers proper growing on the island. The cocoa-nut palm is not uncommon, and the cabbage palm (*Oreodoxa oleracea*) has four magnificent representatives at the head of Hamilton Harbor. The trunks rise fifty feet or more and are about seven feet in circumference five feet above the base. Of the India-rubber tree, a magnificent specimen is one of the first things met by the visitor on landing. The calabash (*Crescentia Cujete*) is not uncommon. It supplies the colored people with many useful utensils. I saw one mahogany-tree, and, in a cool, moist dell, several coffee-trees. The true mangrove (*Rhizophora Mangle*) and the false mangrove (*Avicennia nitida*) fill the swamps and lagoons with their trunks and clustered roots. The oleander is very abundant, forming the common hedge. It is of great value in holding together the shifting sand, for it grows everywhere, even on the least promising dunes. The sago palm (*Cycas revoluta*) is a common ornament of the lawns. Though not properly to be mentioned with the trees, the century-plant is met with everywhere, and not infrequently I saw it in blossom or in fruit. The Spanish bayonet (*Yucca aloifolia*) is often used for hedges.

Governor Lefroy, in a list of plants published in Bulletin No. 25, U. S. Nat'l Museum, distinguishes about 150 species as introduced by natural means. He also gives a very full and interesting list of artificially introduced species and of others which refused to thrive. There is also a list locally published, prepared by Mr. Oswald A. Reade, a pharmaceutical chemist formerly stationed at the dock yard.

The following plants were collected between March 8th and April 2nd. Unless otherwise mentioned they were then in flower. Dr. N. L. Britton kindly aided in the preparation of the list of phanerogams and Miss E. G. Knight identified the ferns.

List of Bermuda Plants.—Collected March, 1885, and deposited in the Herbarium of Columbia College.

Ranunculus parviflorus, L.
Ranunculus muricatus, L.
Argemone Mexicana, L.
Papaver dubium, L.
Fumaria densiflora, DC.
Raphanus sativus, L.
Alyssum maritimum, L.
Cakile maritima, Scop., var. *æqualis*, Chapm.
Cerastium viscosum, L.
(*Stellaria media*, Smith.)*
Sida carpinifolia, L.
Oxalis corniculata, L.
Geranium Carolinianun, L.
(*Medicago denticulata*, Willd.)
Medicago lupulina, L.
Melilotus officinalis, Willd.
Œnothera rosea, Ait.
Bryophyllum calycinum, Sals.
(*Opuntia vulgaris*, Mill. In fruit.)
Smyrnium olusatrum, L.
Spermacoce tenuior, Lam.
Sherardia arvensis, L.
Solidago sempervirens, Ait.
Bidens leucantha, Willd.
Cichorium Intybus, L.
(*Taraxacum officinale*, Weber.)
(*Plantago major*, L.)
(*Plantago lanceolata*, L.
Anagallis arvensis, L.
Erythræa Centaurium, Pers.
Nerium Oleander, L.
Asclepias curassavica, L.
Ipomœa Nil, Rth.
Dichondra repens, Forst.
(*Nicotiana Tabacum*, L.)
(*Tournefortia gnaphalodes*, R.Br.)
Salvia coccinea, L.
Stachys arvensis, L.
Stachytarpha Jamaicensis, V.
Lippia nodiflora, Rich.
Lantana crocea, Jacq.
Lantana odorata, L.
Avicennia nitida, Jacq. In fruit.
Veronica arvensis, L.
(*Rumex crispus*, L.)
Euphorbia Peplus, L.
Euphorbia buxifolia, Lam.
(*Urtica urens*, L.)
Aloe vulgaris, L.
Richardia Æthiopica, L.
Commelina nudiflora, L.
Stenotaphrum Americanum, Schrank.
Chloris petraca, Thurb.
Oplismenus setarius, Spreng.
Dichromena leucocephala, Michx.
Scirpus validus, Vahl.
Asplenium myriophyllum, Presl.
Asplenium Magellanicum, Kaulf.
Asplenium parvulum, M. & G.
Adiantum cuneatum, Lang. & Fisch.
Aspidium patens, Swartz.
Nephrolepis exaltata, Schott.

Note on Veronica Anagallis, L.

By N. L. Britton.

In the latter part of September, 1883, while botanizing near the village of Mahwah, Bergen Co., New Jersey, I noticed in a small stream which crosses the N. Y. L. E. & W. R. R., half a mile or so north of the station, a very strong and abundant growth of a *Veronica*, whose broad, obtuse, nearly sessile, slightly serrate leaves, and nearly erect habit seemed peculiar, and different from any form with which

* Plants in parenthesis were noticed but not collected.

I was acquainted. The plant was not noticed anywhere else in the immediate vicinity.

Since that time I have received specimens of what is evidently the same form from Dr. H. H. Rusby, collected at Franklin, Essex Co., from Prof. Porter, collected at Manunka Chunk, Warren Co., and have myself gathered a closely similar plant from the valley of the Delaware River, above Flatbrookville in Sussex Co. These last specimens were somewhat more erect in habit and not quite so broadly leaved as those from the other localities noted. It would therefore seem to be widely distributed through Northern New Jersey.

In general aspect it closely resembles *V. Beccabunga*, L., of Europe, differing mainly in the almost universally sessile, more or less clasping leaves, *V. Beccabunga* being described and figured (Engl. Bot. Pl. 655; Ettingshausen & Pokorny, Phys. Plant. Austr. t. 780) with petioles, which de Candolle (Prodr., x., 468) says are from one to two lines long, though in an English specimen they are a quarter inch. However, in a German specimen marked *V. Beccabunga*, in the Meisner herbarium the leaves are as sessile as in the ones now referred to, and indeed it resembles these very greatly. There is some doubt, therefore, to which species my plants belong; indeed they would seem to connect the two in certain respects, as the characters of pod and pedicel are not sufficiently different for diagnostic characters. The flowers likewise are intermediate in size between those of the two species, though perhaps more like those of *V. Anagallis* in this respect, but blue. As the species are considered distinct by foreign authorities, and as I do not wish to complicate synonomy, since genuine *V. Beccabunga* with strongly petioled leaves has not yet been detected in America, I propose that for the present we shall know this Northern New Jersey plant as *V. Anagallis*, L., var. LATIFOLIA. Dr. Rusby's specimen above alluded to has acute leaves tapering from a broad sessile base. If the German specimen mentioned had been collected in this country I should unhesitatingly include it in the variety here proposed.

V. Americana, Schwein. (*V. Beccabunga* of older American authors) is generally sufficiently characterized by its oblong or elliptical-lanceolate, strongly serrated leaves, subcordate, truncate or even acute at base and distinct petioles to be easily separated from the two other species. English specimens labelled *V. Beccabunga* in the Torrey Herbarium resemble the common American form very closely, however, and in some native plants which I have examined the serration is much less prominent than usual.

V. intermedia, Schwein. (*Amer. Journ. Sci.* I., viii., 268,) referred to *V. Americana* by Dr. Gray (Syn. Flor. N. A., ii, pt. i., 287) is shown by Schweinitz's specimen in the herbarium of the Academy of Natural Sciences of Philadelphia to be *V. Anagallis*, as Mr. J. H. Redfield has noted on the sheet.

The great variation in leaf-forms exhibited by these plants, without correspondingly wide variations in the inflorescence and fruit, gives credence to the supposition that they are but varieties of a single widely diffused species, to which other described forms may well belong.

The Relations of Pinus edulis and P. monophylla.—*Pinus monophylla*, Torr. and Frem., was described in Fremont's "Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and Northern California in 1843 and 4," Washington, 1845, House Doc. No. 166, p. 319. Pl. 4. The specimens upon which the description was based were obtained from "Northern California, longitude 111° to 120°"; mostly from an area now included in the State of Nevada. Among the specimens brought in by Fremont were some in which the leaves were both single and double, but the double leaves were rare exceptions to the general rule.

In the years 1857, 8 and 9, and later, I passed in many directions through most of the country occupied by *Pinus edulis* and the so-called *P. monophylla*, in the northern states of Mexico, Arizona, New Mexico, Colorado, Utah and Nevada, and I found the facts in regard to the relations of these two forms to be essentially these:

The chosen habitat and home of *Pinus edulis* is the belt or area of dry country lying between the saline and treeless portion of the "Great Basin" in Nevada and Utah and the higher and better watered mountain ranges which border or divide the desert areas.

In Southern Utah, between the summits of the Wasatch and the Western sage plains in Western New Mexico and Eastern Arizona, as well as some portions of Northern Mexico, the nut-pine attains the largest size and stands thickest on the ground. Here it ranges from 20 to 50 feet in height, has a trunk sometimes two feet in diameter and is universally two-leaved. In Nevada and Western Utah the trees are smaller in size, more scattered, and usually have but a single cylindrical leaf. Where the areas of these two varieties meet it is very common to find trees in which the foliage is about equally divided between the single and double forms. Hence it would seem that the single-leaved variety is a somewhat dwarfed and depauperate form, the effect of aridity of climate; and the single solid leaf is apparently an exhibition of the tendency so conspicuous among desert plants to reduce the ratio of surface to mass in the leaves, or the parts of the plant which perform the functions of leaves. In *Cactus*, *Holocantha*, *Canotia*, *Ephedra*, etc., we see the extreme form of this self-protective modification, no leaves but an epidermis which does what little there is for leaves to do, and in *Cactus*, *Holocantha*, etc., a formidable array of spines to protect this from possible injury. Dr. Torrey, to whom more than twenty years ago I showed my specimens of *Pinus monophylla* and *P. edulis*, agreed with me in considering them only varieties of one species. Mr. Thomas Meehan, in his interesting note lately published on this subject,* considers the two forms as of common origin, but as constituting distinct species. It seems to me, however, they are typical varieties of common origin and shading into each other, and of unusual interest, since their relationship can be easily traced, and, if I am right, the causes which have produced the differences are easily comprehensible.

J. S. NEWBERRY.

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* Proc. Phila. Acad. Nat. Sciences, 1884, p. 295, and this journal.

Three Desmids new to the United States.—In the year of 1875 there was published a series of various algæ, and (also many desmids), chiefly new species and varieties, from all parts of the world, by Paul Reinsch at Erlangen (Franconia, Germany.) This work, which was dedicated to the eminent algologists Sir W. Archer, O. Norstedt and L. Rabenhorst, contains quite a number of desmids, and is entitled Contributiones ad Algologiam et Fungologiam, auctore Paulo Friderico Reinsch. Vol. I. Accedunt tabulæ CXXXI. Melanophyceæ: tabulæ LXI. Rhodophyceæ: tabulæ LXII. Chlorophyllophyiceæ: tabulæ XVIII. Fungi: tabulæ IX. Lipsiæ T. O. Weigel. MDCCCLXXV. pp. XII. 103. 4to.

I find three new species of desmids in this work which are not enumerated in Wolle's "Desmids of the United States," and which for this reason, can be considered as new to the United States.

1. *Staurastrum Pseudo-Cosmarium.*—Semicellulæ a latere late ovato-cordatæ, margines laterales crenulato serrati; cellulæ a vertice trigonæ marginibus lateralibus rectis; isthmi latitudo $\frac{1}{3}$–$\frac{1}{4}$ semi cellulæ latitudinis. Longit. 0.0786$^{mm.}$. Latit. 0.056$^{mm.}$

Hab. Pennsylvania, North America.

Tab. ix., Fig. 1 *a*. Specimen a latere. Fig. 1 *b*. Specimen a vertice. p. 91–92.

2. *Xanthidium Nordstedtianum.*—Semicellulæ a latere late transverse ovato-truncatæ incisura acutangula latiore disjunctæ, anguli quatuor spinis tenuioribus binis armati, anguli laterales spino singulo armati. Longit. 0.053$^{mm.}$. Latit. 0.0333$^{mm.}$. Spin. longit. 0.0112$^{mm.}$

Hab. Pennsylvania, North America. Erlangæ Franconia.

A *Xanthid. cristato*, Bréb., differt dimensionibus minoribus, spinis tenuioribus in basi non dilatatis, semicellulis longioribus incisura acutangula disjunctis. Dimens. *Xanth. crist.*: longit. 0.0621$^{mm.}$, latit. 0.059$^{mm.}$ (spin. excl.)

Tab. x. Fig. 6. Specimen a latere, ex massa ex algis unicellularibus composita. p. 92.

3. The work also contains a third species, which is described and figured, but not named. It is a

Cosmarium spec.—Semicellulæ elliptico-ovales in inferiore parte se adtingentes margine superiore late rotundato; isthmi latitudo triens diametri transversalis, membrana verruculis dense absque ordine dispositis exasperata; diameter transversalis diametri longitudinalis dimidio paulo minus. Longit. 0.0448$^{mm.}$. Latit. 0.025$^{mm.}$

In massa algarum, Easton, Pennsylvania. America borealis.

A *Cosmario Botrytis* sat distincta species.

Tab. x., Fig. 7. Specimen a latere. p. 84.

I give this species the name *Reinschii* and will include it in the list of American desmids as COSMARIUM REINSCHII, m.

Kolosvar, Hungary. JULES SCHAARSCHMIDT.

Cleistogamy in Lamium.—Early in March there were brought to me some plants of *Lamium amplexicaule*, L., which, despite the earliness of the season, seemed to be on the point of flowering, many of the buds showing color.

Late in April other plants were examined. Still there were no

open flowers; but the buds had enlarged and crimsoned in axillary clusters.

In all cases the projecting corolla tube was closed by what appeared to be a conical cap of densely crowded crimson hairs, the whole calling to mind the capsule of a moss with hairy terminal calyptra. This hairy cap proved to be formed by the villous upper lip of the corolla densely folded over the lower lip, which was colorless save a spot of pink on its central lobe. The lips could be separated by pressure.

Within, the stamens and pistils, arrested in their forward growth in the blind tube, had turned and twisted themselves into a contorted mass which perhaps would have pressed open the closed doors of their prison or burst its walls had it not been accommodated by the dilated throat of the corolla, which it will be remembered is a floral characteristic of the dead nettle and others of its family.

The confined anthers were discharging pollen. This consisted, as normally, of innumerable granules, but the entire product of each anther was united into a single mass by a moisture which pervaded the imprisoned floral organs. These pollen-masses, even before they were free from the anthers, were found adhering to the confined stigmas, so that anthers and stigmas were frequently joined together by the viscid mass.

In some of the flowers the imprisoned styles were double the length of the corolla, and in accommodating themselves to their cramped quarters had writhed into strangely twisted positions. In one case the slender style, finding its advance checked, had returned down the tubes and applied its stigmas to the clustered anthers from above them. In another case the stigmas in their ascent had become entangled and detained among the anthers, causing the lengthening style to twist in a circle on itself in the lower part of the tube.

Now I would ask are these flowers to be considered as truly cleistogamous. Are they not rather the usual flowers cleistogamous through retarted development; in other words, adaptively cleistogamous? Plainly they are nothing more; they are the common flowers somewhat contracted and remaining closed.

It would seem that the plant resorted to self-fertilization when, from adverse conditions, no better opportunity of reproduction offered itself.

EUGENE P. BICKNELL.

Flora of Chenango County, N. Y.: some plants not previously reported from that region.*

Ranunculus bulbosus, L.—Not common.

Aconitum uncinatum, L.—A single specimen found on the bank of the Chenango River, near Oxford. Perhaps indigenous.

Nuphar luteum, Smith, var. *pumilum*, Preston. Not seen in flower.

Cardamine pratensis, L.—Rather common

Arabis perfoliata, Lam.—Occasional.

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* Read before the Natural History Society of Cornell University.

Viola Selkirkii, Pursh.—Oxford. Rare.

Hypericum pyramidatum, Ait.—Common along the Chenango River.

Mollugo verticillata, L.—Uncommon. Beginning to be introduced along railroads.

Acer saccharinum, Wang., var. *nigrum*, Gray.

Trifolium agrarium, L.—Quite firmly established.

Melilotus alba, Lam.—Beginning to be introduced along the Chenango River.

Potentilla palustris, Scop.—Borders of ponds, Preston.

Linnæa borealis, Gronov.—Oxford. Rare.

Valerianella radiata, Dufr.—Oxford. In an alluvial meadow, near the old Chenango Canal, and possibly introduced from it.

Cichorium Intybus, L.—Occasional at roadsides.

Andromeda ligustrina, Muhl.—Locally abundant on dry hills.

Chimaphila maculata, Pursh.—Oxford. Rare.

Pentstemon pubescens, Solander.—Not common.

Veronica Buxbaumii, Tenore.—Occasional in gardens.

Monarda fistulosa, L.—Preston. Locally abundant.

Mertensia Virginica, D C.—Uncommon. Banks of Chenango River.

Polemonium cæruleum, L.—Abundant on the borders of several small swamps, and in wet meadows, in Preston and McDonough, near East McDonough.

Euphorbia Peplus, L.—Not common, but abundant where found.

Humulus Lupulus, L.—Plainly indigenous on the Chenango River.

Arisæma Dracontium, Schott.—Not common.

Scheuchzeria palustris, L.—Rare. Preston.

Habenaria blephariglottis, Hook.—Rare. Smithville.

Listera cordata, R. Br.—Rare. Smithville.

Corallorhiza innata, R. Br.—Rare. Oxford.

Smilacina trifolia, Desf.—Rather common in peat-bogs.

Erythronium albidum, Nutt.—Oxford. In an alluvial meadow near the village, a patch of perhaps fifty plants, growing with *E. Americanum*.

Camptosorus rhizophyllus, Link.—Oxford. Local.

Botrychium matricariæfolium, A. Br.—Common.

Botrychium lanceolatum, Angs.—Rather common.

FRED. V. COVILLE.

Botanical Notes.

Kalmia angustifolia.—Mr. Walter Hayden, who has resided for some time in the Hudson's Bay Territory, states that the twigs, with leaves and flowers of this plant are used by the Cree Indians in bowel complaints and as a tonic. Their name for the plant is *wisukapuk*, 'bitter leaf.' The leaves of the allied *Kalmia latifolia* are said to possess poisonous, narcotic properties, and to prove fatal to sheep and some other animals, although they are eaten with impunity by deer, goats and partridges. Dr. Barton, in his "Collections," states that the Indians sometimes use a decotion of the leaves to destroy themselves. It is pointed out in the U. S. Dispensatory that

Kalmia angustifolia probably possesses properties identical with those of *K. latifolia*. It is remarkable, therefore, that it should be used as a tonic by the Crees. The coldness of the climate of Canada, may however, modify the development of the poisonous principle, if the plant really possesses any.

Spicate Inflorescence in Cypripedium insigne.—At a recent meeting of the Philadelphia Academy of Natural Sciences, Mr. Thomas Meehan referred to specimen before him, of *Cypripedium insigne*, an orchid from the cooler parts of the East Indies, which had a spike with two flowers and other undeveloped buds, the normal character being a one-flowered scape. These departures from the normal form, he said, afforded valuable lessons, though frequently passed over as mere freaks of nature. A spicate infloresence was a common characteristic in allied species. From the present illustration we might infer that the one-flowered kinds were species in which the power to develop a proper spike had been arrested. We might expect to see attempts at this form of inflorescence in *Cypripedium acaule* of our own country.

A very important lesson from these occasional departures had but recently had the attention given to it that it properly deserved, and that was that whenever any particular plant departed from its normal form, there came into existence other characters, which, in a separate plant would, and often did, obtain for the new departure the rank of a species. In this instance, the second flower on the spike was different from the lower and normal one in the upper segment of the perianth (sepals) having a regular outline. In the normal form it was so crumpled as to present a trilobed appearance. In the normal form the labellum was so elongated as to be three times the length of the column. In the upper flower the labellum was but double the length, giving it a somewhat globular appearance. There were other variations that formed a combination of characters quite sufficient to mark a species if they were constantly produced in a separate state. Why could not this rare occurence become a continuous one, and thus a new species be formed—created, we may say—out of an older one? There can be no reason why not. We may call this a freak of nature, but it could not have occurred without that combination of circumstances which we call law. We have no warranty for saying that a law which has operated to produce a departure in a solitary instance like this, might not have a more permanent power at some other time. Nor is there any warranty for believing that a law which has operated as we see here on one plant, might not operate on a hundred, or on all the plants of a district, or even on plants in separate districts widely separated from each other.

Abrus precatorius.—The pretty scarlet seeds of this leguminous plant, known as 'red bean' and 'love pea,' contain a poisonous principle, and, according to Mr. Boverton Redwood, are used in the Punjab for poisoning cattle. The sheil of the seed is removed, the seed softened in water and pounded into a paste, which is then rolled out into little cylinders, about three-quarters of inch long, sharpened at one end. After careful drying, the cylinders are further sharpened by being rubbed on a brick, and are finally soaked in animal fat, and fitted into a wooden handle with their point just protruding. Upon

a blow being struck with this weapon, the point, called a *sui*, penetrates the flesh, and being but loosely fitted into the handle, remains in the wound. Death ensues, on an average, in forty-eight hours.

The Continuity of Protoplasm.—Dr. Schaarschmidt has recently pointed out that the continuity of protoplasm is well shown in the pith of the mistletoe, a transverse section of the stem colored with eosin showing the thread, visible as a faint streak almost entirely enclosed by the cell wall, the protoplasm which fills the cell sending six or eight delicate threads through the closing membrane. The continuity is also visible in the cortical parenchyma, and can be determined throughout the entire epidermis.—*Journ. Micr. Soc.*

Homology of the Floral Envelopes in the Gramineæ and Cyperaceæ.—In a paper with this title in the *Journal of Botany*, Mr. T. Townsend attempts to prove that the palea in the floret of grasses is the homologue of the ochrea and utriculus in *Carex*, that the latter is a single floral envelope, and that the seta found more or less developed in many species of *Carex* is the rudimentary development of a secondary axis, while the acicula of Dumortier is the terminal portion of the main axis of the spikelet, so that the seta and acicula are analogous portions of two different axes.

The formation of Oil Receptacles in the Fruit of the Umbelliferæ has been investigated by J. Lange. He finds that they originate from a group of four cells, distinguished from the surrounding ones by their greater refrangibility. They are arranged in the corners of a square with an intercellular space between them, which gradually develops into the oil receptacle. These secreting cells have very thin walls and a clear translucent protoplasm.—*Journ. Micr. Soc.*

The formation of Gum in Wood has been examined by B. Frank in a number of leguminous and rosaceous trees. He finds that it is the universal product of special conditions, and can always be induced by the production of these conditions, as, for instance, by wounding any part of the stem. After four or five weeks the cells of the medullary rays are nearly filled with gum, its formation commencing in the cavities of the vessels and wood cells, which assume a more or less yellow or red color due to small granules resulting partly from metamorphosis of starch grains. The purpose of the internal formation of gum appears to be to form air-tight plugs to the vessels, this oject being aided by the formation of thyllæ or cells inside the vessels.—*Journ. Micr. Soc.*

The Spores of Lycopodium.—Mr. D. H. Galloway, of the Chicago College of Pharmacy, has made some measurements of the spores of *Lycopodium* with the following results: He made careful measurements of 50 spores and found their average diameters to be seven six-thousandths of an inch, the largest having a diameter of eight six-thousandths and the smallest six six-thousandths of an inch. It would therefore take 857 of them laid side by side to make an inch in length; to cover a square inch 734,449 would be required; and to fill the space of a cubic inch 629,422,793. Or, in terms of the French system, a row one centimetre in length would contain 343 spores; a square centimetre, 117,649, and a cubic centimetre, 40,353,607. On measuring the capacity of one of Powers & Weightman's

dram morphine bottles he found that it was almost exactly 40cc., therefore one of the bottles would contain 1,614,144,280 of these spores. The same bottle will hold 10,600 flax-seeds, 350 cubeb-berries, 250 grains of allspice, 66 *Coculus Indicus* seeds, 20 nux-vomica-seeds, 4,200 canary-seeds, 8,400 dill-seeds, 2,900 grains of paradise, 1,250 hemp-seeds, 500 black pepper berries, 661 white pepper berries, 3,250 stramonium-seeds, and 100 pumpkin-seeds. It will thus be seen that one hemp-seed equals in size 1,291,315 lycopodium spores.—*Western Druggist.*

Cowania Havardi.—Mr. Watson wishes us to state that the species described by him under this name in the *Proceedings* of the Amer. Acad. Arts and Sciences, xx., p. 364, is *C. ericæfolia*, Torr., collected previously only by Parry in the same region, and his specimens probably only in the Torrey herbarium.

Proceedings of the Torrey Club.—The regular meeting of the Club was held at Columbia College, Tuesday evening, April 14th, the President in the chair and 25 persons present.

Mr. J. F. Kemp read a paper upon the Winter Flora of the Bermudas.

Mr. Thos. Hogg gave an account of the flora of Nassau.

Dr. Britton exhibited stem of *Nesæa verticillata*, HBK., covered with a spongy parenchyma. Miss Knight exhibited and remarked upon gold fish that had succumbed to an attack of *Saprolegnia ferax*.

Two persons were elected active members.

Correct and Incorrect Addresses.—The recent receipt, in a round about way, by the Editor, of a letter which had been mailed to him some weeks previously, leads him to give the following directions in regard to addressing communications: All communications for the BULLETIN, all business matters relating to it, and all exchanges should be addressed simply to W. R. Gerard, 61 Clinton Place, New York. Please omit the useless words "Editor of the Bulletin of the Torrey Club." Communications for the Treasurer should be addressed for W. H. Rudkin, 74 William St., New York. Communications to the Club should be sent to the Secretary, Arthur Hollick, New Brighton, N. Y. Specimens of plants for the Club should be sent to Dr. N. L. Britton, School of Mines, Columbia College, New York.

Since we cannot, by letter, impress upon the minds of news agents that the BULLETIN has no business office, we shall ask them in print to address no letters to the "Torrey Botanical Club," or "Bulletin of the Torrey Botanical Club," or "Torrey's Botanical Bulletin," or "Publisher of the Torrey Bulletin." Letters so addressed may, through the perseverance of some letter-carrier, finally reach their destination, but they stand an equal chance of going to the Dead Letter Office.

BULLETIN
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Some Notes on Generic Names.

By W. R. GERARD.

AQUILEGIA.—"We read in botanical dictionaries that *Aquilegia* . . . . is derived from *aquila*, an 'eagle,' because of the fancied likeness of the flower to that bird. . . . However, to be a little critical, though *aquil-* might do very well for 'eagle,' the *egia* would puzzle the etymological genius of Cicero himself. There is, however, a good Latin word, *aquilegus*, meaning 'collecting water'; and Pliny tells us that well-sinkers were called by the Romans *aquileges—i. e.*, 'water collectors'; and who has not noticed the water-collecting habit of the curly leaves of the columbine, when they are covered with silver drops after a shower of spring? Would it not be more respectful to the intelligence of the giver of the name to believe that it was intended in this sense? . . . I do not claim to have made any new discovery about the word *Aquilegia*, my surprise is that any one knowing Latin could ever have given it any other meaning than that which I have given; but, on looking into different books, I find that all but one, which explain the name at all, explain why the plant is 'very like an eagle,' even including the lexicon of that admirable scholar, Littré, under *ancolie*, the modern French form of *Aquilegia*. The Penny Cyclopædia alone of books I have consulted explains *Aquilegia* as 'water-gatherer.'" Rev. C. Wolley Dod, in *Gardeners' Chronicle*, June 9th, 1883, pp. 719, 720.

In addition to the etymology proposed by Mr. Dod, and to the one universally given in botanical works, there is still another, which would derive the word from Aquileia, or Aquilegia, a Roman city on the confines of Italy, in the vicinity of which the columbine grows in great abundance.

In order to obtain the true meaning of any word it is necessary to first ascertain its earliest recorded form. This, in the case of the one under consideration, is *aquilea*, and is found in the works of Albertus Magnus (13th century). This old author, in speaking of the form that the flower assumes in different plants, says: "Aut enim prætendit obscuram quandam convenientiam cum avis figura, sicut flos oleris qui vocatur *aquilea*, eo quod quatuor aquilas flos ejus figurare videtur;" and, further along: "aliquid autem simile hujus habet flos urticæ mortuæ et violæ, nisi quod alas avis non ita exprimit sicut *aquilea*." (Parva Naturalia, p. 381.) From this it appears that Albertus regarded the Latin name of the columbine as due to an obscure resemblance of its petals to the *wings* of an eagle—and not of its spurs to the talons of that bird, as explained by some, or to the beak, as suggested by others. He probably had never seen the plant, but

wrote from hearsay. However this may be, the early form of the word which he adduces disposes of the notion that the meaning is 'water-gatherer.'

Caspar Bauhin, probably regarding the first two syllables of *Aquilegia* as due to an original *acui*, from *acus* (cf. *aquifolium*, now the specific name of the European holly, for *acuifolium*), says that the name was applied to the plant "ob florum mucrones aduncos." Grassmann (Deutsche Pflanzennamen, p. 28), commenting upon this explanation, says that it "is much more applicable to the German [name]." The German popular name of the columbine, *aglei*, is derived by Kluge, in his recent Etymologisches Wörterbuch der deutschen Sprache (Strassburg, 1884) from Lat. *aquilegia*, and the word is traced back by him, through M. H. Ger. *agleie*, to O. H. Ger. *ageleia*. But, if we examine the history of the Ger. word, we shall find that in O. H. Ger. (period between the 8th to the close of the 11th century) *ageleia* was the name, not of the columbine, but, of a totally different plant—*Dipsacus fullonum*, L. In M H. Ger. the same name, with its numerous variants, was applied to *Aquilegia vulgaris*, L., and, later still, to *Ranunculus arvensis*, L., and *Ononis spinosa*, L. What is there in common between these so diverse plants that they should have received the same popular name? The etymology of the O. H. Ger. word answers this: *Ageleia* is a derivative from old Ger. *agele*, 'chaff,' 'awn,' 'spike' (cognate with Lat. *aculeus*.) The *Dipsacus* was so called, then, from the aculeate chaff of its heads of fruit, *Aquilegia* from the aculeate spurs of its flowers, *Ranunculus* from its bur-like fruit, and *Ononis* from its spiny leaves.

In DuCange's Glossarium mediæ et infimæ Latinitatis we find *aquilea*, 'herba valens ad oculos.' This points to *Dipsacus*, the water contained in the cup-shaped bases of the leaves of which was anciently used as a collyrium. In the Middle Ages *aquileus* (changed from *aquilus*) was an adjective of color meaning 'brown' or 'black'; but *aquilea*, which at first sight would seem to be the feminine form of this adjective, must have had a different origin, and we may assume that it arose through a confusion, by the scribes, of the first two syllables of the Ger. name with *aqua*, 'water.'

There would appear to be no doubt, that *aquilea* (later, *aquilegia*) is a mere corruption of the Ger. word *ageleia*. This is the view of it taken by those who have investigated the Ger. popular names of plants, *e. g.*, E. Meyer, H. Grassmann, and Pritzel and Jessen.

It is worthy of remark that no people seem to have seen in the spurs of the *Aquilegia* a resemblance to the talons or beak of an eagle, and so in no language do we find any popular name for this plant that embodies any such idea.

The five spurred petals with incurved tips were at an early period compared to five doves, the sepals representing the wings; and this suggested the herbalist's Lat. name *columbina* (sc. *herba*) 'dove-like (herb),' whence O. Fr. *columbine*, Eng. *columbine* and Ital. *colombino*. The herbalist's name *aquilina*, used as a substitute for what was regarded as an irregularly formed derivative from *aquila*, gave Ital. *aquilina*, and the translated names, Polish *orlik*, 'aquiline' and

Bohem. *worlicek*, 'aquiline.' The corrupted Ger. name passed into other languages as: Du. *akelei*, Swed. *ackeia*, O. Fr. *anquelie*, Fr. *ancolie*, Walloon *âcolète*, Ital. *achellea*, *acquilegia*, Span. *quilena*, Port. *acquileja*, Gael. *a'cholmsin*. In French the plant has likewise been called *aiglantine* (a dimin. of O. Fr. *aiglant*, from L. Lat. *aculentus*, derivative from *aculeus;* referring, as in Ger., to the aculeate spurs), and, corruptly, *galantine*. The flowers of the columbine have by some been likened to bells; hence Du. *klokkebloem*, 'bell-flower,' Dan. *klokken*, 'bells', Swed. *tysk klockor* 'silent bells' Russ. *kolokoltschiki*, 'bell-flower,' Hung. *harangvirag*, 'bell-flower.' Finally, other popular names are: Fr. *fleur de parfait amour*, 'flower of perfect love,' Ital. *perfetto amore*, 'perfect love,' Port. *amor perfeito dos velhos*, 'old-folks' perfect love.' Polish *rozycyka*, 'little rose,' Fr. *gant de nôtre dame*, 'our lady's glove,' *manteau royal*, 'royal mantle,' *herbe de lion*, 'lion-wort,' and (as an offset to so much poetry) Swed. *torrvärks-gräs*, 'rheumatism-grass.'

SPERGULA.—Said by Prof. Eaton (Manual of Botany) to be from "Lat. *spergo*, 'to scatter,' from the dispersion of its seeds," a statement copied by Prof. Wood, in his Class-Book.* Dr. Gray, in his Manual, has corrected the Latin word to *spargo*. *Spergula*, however, has nothing to do with *spargo*, but is merely a Latinized form, by Dodoens, of the German popular name *spergel*.

Spergula arvensis, L., has for several centuries been cultivated throughout Germany as a forage-plant, and has hence received many popular names, several of which are corruptions of one and the same word. One of these names is *sperg* (found also in the forms *spark*, *sperk*, *spirk*, *spörk*, *spurk*), of which *spergel* is a dimintuive. *Sperg* is an abbreviation of *spergis* (*spurgis*, *sporges*), a corruption of M. Lat. *sparagus*, for Lat. *asparagus*. The plant was so named from its resemblance to the asparagus in its whorled branches and thread-shaped leaves.

BRUNELLA.—This word is, in botanical works, derived from Ger. *braune* (Gray), *brune* (Wood), *breune* (Darlington; Eaton). As a matter of fact, it is a Latinized form (by Brunfels) of the Ger. popular name *brunelle* a dim. of M. H. Ger. *brun*, 'brown.' The plant was so named in German from the brown color of its calyx after flowering, and this, on the doctrine of signatures, indicated the use of the herb for the cure of quinsy, called in German *braune*, 'brownness,' alluding to the color of the fauces when afflicted with that disease.

TROLLIUS.—An abbreviation of *trollius flos*, a translation (by Conrad Gesner) of the Ger. popular name *trollblumen*. "Trollius flos, ut nostrum vulgus appellat." (Gesner.) The meaning of *troll* in the compound is not very clear. It is usually suggested that it is an old German word signifying 'a globe,' or 'something round'; but there is no old German word having such a sense.

LEPIDIUM.—Gr. λεπίδιον, 'little scale,' explained in all botanical works as alluding to the small pods; but the original species, *L. latifolium*, L., was so called from its supposed usefulness in lepra.

CORYDALIS.—From κορυδαλίς (deriv. fr. κόρυς, a 'helmet,

* Due to Linnæus: "*Spergula*, a sparsione seminis." Phil. Bot., Ed. Spreng. p. 255

with a crest'), the Greek name for the crested lark, transferred to *Fumaria bulbosa*, L. (*Corydalis cava*, Schweigg.), from a fancied resemblance of its flower to the crest of that bird. Hence also one of the Ger. names for the same plant, *lerchenhelm*.

ALYSSUM.—"Gr. *α*, privative, *λὐσσα* 'rage;' supposed by the ancients to allay anger." (Wood.) "Gr. *ἀλύσσω*, 'to be mad,' from its being supposed to cure mental maladies." (Eaton.) "Greek name of a plant reputed to check the hiccups, as the etymology [*α*, privative, and *λύζω*] denotes." (Gray.) At least two plants were anciently called *ἄλυσσον*. That of Dioscorides has been identified as *Farsetia clypeata*, R. Br., and that of Galen as *Marrubium Alyssum*, L. The plant mentioned by Galen is said by him to have been so called from its being good for the bite of a mad dog, and the same properties are assigned by Dioscorides to the *Marrubium*.

VINCETOXICUM.—The root of *Vincetoxicum officinale*, the plant to which this name was originally applied, was once held in some repute in Germany as an antidote to poison, and was known to materia medica as *Contrayerva Germanorum*. Hence the popular and Lat. names: Eng. *tame-poison*, Fr. *dompte-venin*, Ger. *widergift*, and Lat. *vincetoxicum* (from *vincere* and *toxicum*).

LYTHRUM.—From Gr. *λύθρον*, 'clotted blood;' not, as usually stated, in all botanical works, from the color of the flowers, but from the original species (*Lythrum Salicaria*, L.) having, on account of his astringency, been used to arrest hemorrhages.

Use of Spines in Cactuses.—Our brethren across the water, assuming that thorns are simply for protection in a military sense, are exercising themselves in their serials over the spiny leaves of the holly. When young and vigorous, *i. e.*, in early life, the teeth are very spiny; when the tree is aged and the branches then a distance above the surface of the ground, losing vigor, the spines are weak or absent. Sir John Lubbock and others, following the poet Southey, see in this a beautiful adaptation for protective purposes. When within the reach of animals, spines are borne, when high up where animals cannot reach, spines are unnecessary. Numbers of species of plants have mucronate points to the leafy serrature, which are wanting in maturer years. It is at any rate difficult to imagine why a sharp point should be made especially for protection, and points less sharp for no protective use at all.

I have often reflected on the fact referred to by Dr. Newberry, that our thorniest plants are in much greater proportion in places where animal life is scarce, and the immense police force sustained by the great vegetable community absolutely thrown away. Cactuses and other thorny things I have seen covered with thorns and spines on deserts where the hot air seemed to be bounding up and down like the surging ocean, and where not even a lizard could have dared to show its face. Thorns cannot be, so I have thought, for protection where the climate gives all the protection desired. I am not one who doubts that nature has a purpose in every move she makes, but the main purposes I think we seldom reach, and that we

do ourselves an injury in research by assuming mere incidental uses as the main purposes for which structures seem to be "adapted."

One of these uses in the spines of cactus has occurred to me after reading Dr. Newberry's remarks on *Pinus edulis* in the last number. They break the full force of the sun on the plant, a force it is made to endure and not to love, as we know who have learned to cultivate it. Plant lovers set out their treasures in summer under "arbors" of fish-netting or galvanized wire, and those who have no experience would be surprised to find how the moving shadows of the twine or wire lowers the temperature. A mass of spines on a cactus must certainly have the same effect. A cactus does not need much light on its epiderm to keep healthy. On the dry mesas along the Uncompahgre River I have seen some aggregated masses of *Echinocactus phœniceus* forming dense hemispheres a foot high and as much wide, with spines so thoroughly interlaced with spines as to rival the hedgehog, and leaving not a particle of the green surface visible; and there are species not cæspitose, such as *E. pectinatus*, which no one can see for spines without cutting apart, and forming a complete protection from the hot suns under which they are doomed to live.

I do not suppose I have yet reached the final purpose of spines in a cactus any more than we have the final purpose in the existence of the cactus itself, but that one use of cactus spines is to furnish a partial shade I feel to be beyond a doubt.

THOMAS MEEHAN.

Gyalecta lamprospora, Nyl.—In a recent number of the *Regensburg Flora*, Dr. Nylander, of Paris, has described a lichen sent him by me as follows: "Thallus white, opaque, thin; apothecia becoming black, superficial, opaque, subrugulose, about 0.5$^{mm.}$ or less in diameter; spores 8, without color, narrowly oblong, muriform-divided 0.100–110$^{mm.}$ long, 0.010–11 broad, in the middle somewhat constricted, paraphyses slender, the epithecium, with the perithecium and the lower stratum of the hypothecium, dark colored. Reaction with iodine fulvous red. On unknown exotic bark. A marked species of a distinct type. Thallus not corticate, all its elements, with the conceptacle of the apothecia, fulvous red; the scanty and confusedly cellular portion reacting similarly. Gonidia mostly chroolepid, connected, medium-sized and emitting lichenose hyphoid filaments. Younger apothecia obtusely margined, with an impressed disk. Thekes pyriform, long stipitate below, spermatia bowed, about 0.018$^{mm.}$ long."

To this description Dr. Nylander adds: "We have distinctly seen each gonidium, and even young gonidia, of this lichen emit from its walls one and even two filaments, characteristically lichenose. It is perfectly evident that these productions are lichenose, and continuations of the wall of the gonidium. What then becomes of 'symbiosis'? for where is here the 'fungus' and where the 'alga'? In the lichen there exist only lichenose elements, as is everywhere demonstrated."

This lichen was sent me by Dr. J. W. Eckfeldt as having been collected near Philadelphia, without further indication. But the

evidently exotic nature of the wood and the fact that two distinctly tropical lichens, a *Pyrenula* and a *Chiodecton*, grew on the same substrate, show that it does not properly belong to the flora of the region where it was found.

H. WILLEY.

Arthrocladia villosa, Duby, at Woods Holl., Mass.—A number of specimens of the above-named alga was collected by me during July and August, 1884. As the Rev. A. B. Hervey has examined a specimen, there can be no doubt as to the identification.

Prof. W. G. Farlow puts *Arthrocladia villosa* into Addenda, p. 183, Marine Algæ of New England, upon the authority of specimens found by Mr. Frank S. Collins at Falmouth Heights. In TORREY BULLETIN, Vol. x., No. 9, p. 106, it is stated that Mr. Geo. W. Perry found specimens also at Menanhant, near Falmouth.

My find is hence (so far as I know) the third one, and the locality is the most southern one yet reported.

JOHN E. PETERS.

Fertilization in Arenaria serpyllifolia.—Those who are continually noting and recording adaptations for cross-fertilization in flowers are to my mind engaged in a useful work. Still, I often wonder why they miss the opposite illustrations. The common weed *Arenaria serpyllifolia* affords a neat instance of behavior, that results in securing self-fertilization. The flower is at its best state of expansion about 8 or 9 in the morning in this region. Examined with a lens it will be found that the three pistils, in expanding, have curved horizontally to the east. In rotating, the stigmatic apex of the pistil catches every one its anther, and holds and retains it to the end. About the hour named, when the flowers are expanded, the pollen may be seen oozing from its cells and completely covering the stigma. The stamens of the outer tier mature pollen later, if indeed they have any at all, for I have never seen any that I thought truly polleniferous. I have examined many flowers but never found a pistil that had not caught its anther and received pollen in the way described.

THOMAS MEEHAN.

Notes from Kansas.—In the Forest Trees of North America, *Rhamnus Caroliniana*, Walter, is mentioned as found in Eastern Kansas. I have not seen it, but *R. lanceolata*, Ph., is quite common here. *Sapindus marginatus*, Willd., grows in Southern Kansas, but it is not credited to this State in the Forest Trees of North America. The writer spent a few days in Southeastern Kansas, Indian Territory, and Southwestern Missouri the latter part of June, and collected *Lechea Drummondii*, T. & G., *Callirrhoe digitata*, Nutt., *Œnothera linifolia*, Nutt., *Galium pilosum*, Ait., in Kansas (not reported from the State before), *Marshallia cæspitosa*, Nutt., not found heretofore within our borders. I expect to take a trip west before long to see what I can find, that I may have something of much interest to exchange.

Paola, Kansas. J. H. OYSTER.

Albino Mertensia.—Several years ago I procured some pips of *Mertensia Virginica* and planted them out. This year a white one bloomed in the bed, and also several pink ones. The pink ones may have flowered before and escaped my notice, but the white could not have done so. Has it been blue until this year and suddenly changed, or has it failed to flower for six or seven years?

E. S. MILLER.

Botanical Notes.

Histological Investigation, as applied to drugs, is evidently becoming an important part of pharmaceutical education in this country, judging from an elaborate paper on *Illicium Floridanum*, published in the *American Journal of Pharmacy* for May. The paper is illustrated with four plates, showing the minute structure of the fruit, seed, leaves, stem, bark and root of the plant. In the same journal a chemical investigation of the root of *Collinsonia Canadensis*, by Mr. C. N. Lochman, is recorded. The author finds that the rhizome contains a resin soluble in ether and partly in alcohol, vegetable wax, tannin, mucilage and starch, while the leaves contain resin, tannin, wax and volatile oil.

The Yaupon (*Ilex Cassine*, L.).—As well known, the leaves of this plant were formerly used by the Southern Indians in making a preparation called "black drink." A large quantity of the leaves was thrown into a great kettle of water suspended over a fire, and the Indians, sitting around, helped themselves to large draughts, which after a short time induced free and easy vomiting. This treatment was continued during two or three days, until it was considered that a sufficient cleansing had been effected. Some of these leaves have been submitted to a chemical examination by Dr. Venable, who reports (*Journ. Amer. Chem. Soc.*, April, p. 100) that he obtained from them a small quantity of caffeine, equalling .27 per cent. of the weight of leaves used. It will be remembered that caeffeine has also been found in "mate" (*Ilex Paraguayensis*), used in South America as a beverage.

The Respiration of Plants.—In a note communicated by Messrs. G. Bonnier and L. Mangin to the Paris Academy of Sciences (*Comptes Rendus*, c. 1303), these authors point out that hitherto the amount of oxygen given out by plants to the air has been supposed to represent the total result of the fixation of carbon. They show that this is not the case, but that at the same time that the carbon is assimilated by the chlorophyll, the protoplasm absorbs oxygen and emits carbonic acid. An analysis of the gas emitted by a plant, therefore, only represents the difference between the amount of oxygen disengaged by assimilation of carbon and the amount absorbed by respiration, and on the other hand, between the carbonic acid decomposed by assimilation and the carbonic acid produced by respiration. Three methods are given for separating the result of the action of chlorophyll from that of respiration. One is by calculating the difference between the whole amount of gas emitted and absorbed by plants exposed to light, and the volume which they emit by respiration

alone in the same light. A second method consists in suppressing assimilation by the use of chloroform or ether without altering the respiration. In the third method, two plants, of which physiological identity has previously been ascertained, are exposed, the one to ordinary air, and the other under similar conditions except that a concentrated solution of barium hydrate is placed in the containing apparatus to absorb the carbonic acid formed. Under these circumstances an excess of oxygen is found in the apparatus without baryta, while in the apparatus containing it the carbonic acid when set free by hydrochloric acid is found to be in excess of that in the other vessel. The conclusion arrived at by the authors from these experiments is that the volume of oxygen disengaged by assimilation is greater than that contained in the carbonic acid decomposed.

Four cases of poisoning through children eating snowberries (*Symphoricarpus racemosus*) are recorded in the *British Medical Journal* for May 16. The symptoms produced were vomiting, purging and delirium, followed by a semi-comatose condition. All four children recovered, although one suffered very severely.

Fossil Fungus.—A certain proof of the existence of fungi at very remote epochs has been furnished by Messrs. B. Renault and E. E. Bertrand, who have found in the tissues of the nucleus of *Sphærospermum oblongum*, a plant of the coal measures, a fossil species preserved by silica. The mycelium of this fungus was composed of delicate branches, which were elongated or irregularly clustered, according to the dimensions of the cells by which they were enveloped. The cells of the hyphæ were 10μ in length by 5μ in width, and appear to have been capable of becoming sporangia or of remaining sterile. The sporangia were ovoid, and 40 to 45μ in length by 20 to 25 in width, and swollen at the side. The fungus belonged among the Chytridiaceæ.—*Revue Scientifique.*

Influence of Heat and Light upon Vegetation.—*Ciel et Terre* gives the researches of Mr. Hellriegel upon this subject. Mr. Hellriegel undertook in the first place to ascertain the lowest temperature at which seeds are capable of germinating, and confined his experiments to 18 species of cultivated plants. The seeds, sprinkled with distilled water, were planted in large receptacles filled with vegetable mould that were raised to constant temperatures of 48° F., 40°, 38°, 35°, and 32°, and kept there for from 35 to 60 hours.

It was found that rye and winter wheat geminated at 32°. Barley and oats showed their cotyledon at 32°, but the root did not start till 35° were reached. Indian corn required 48°. The turnip germinated at 32°, flax at 35°, the pea and clover at 35°, the bean and lupin at 38°, asparagus at 35°, the carrot at 38°, and the beet at 40°.

The respiratory function requires little heat, and operates even in the entire absence of light. Heat and light, on the contrary, are most favorable for the assimilation of carbonic acid and its conversion into carbon. Mr. Hellriegel attaches very little importance to the color of the light.

Influence of Sunlight upon Vegetation.—M. Buysman contributes to a recent number of *Nature* an article on the influence of direct sunlight upon vegetation. He remarks that in the tropics plants are less de-

pendent upon sunlight than in the arctic regions, owing to the constant high temperature. The author considers that the direct solar heat is the cause of the rich vegetation in some parts of the mountains of the temperate zone. The action of the sun's heat is most evident in the arctic regions, where Middendorff observed in full flower a *Rhododendron*, of which the stem and roots were frozen hard in the soil. He also met with a fully developed willow catkin peeping out of the snow, although the branch on which it grew was solidly frozen two inches down from the flower. It is obvious, therefore, that the temperature in the shade is no criterion of the temperature by which the vegetation of plants is raised.

A new Use for Eucalyptus Trees.—The patenting of a process for the manufacture of a preparation of the gum of *Eucalyptus globulus*, which has the effect of thoroughly removing the scales which form on steam-engine boilers, and of preventing rust and pitting, has created a largely increased demand for it both in this country and in Europe. The effect of this preparation in preventing the pitting and corrosion of boilers will, it is expected, extend the period of their usefulness 100 or 150 per cent., and, at the same time, effect a great saving in fuel, as scale is a non-conductor of heat. The company owning the patent, at Piedmont (Cal.), has also embarked in the distillation of essential oils of the *Eucalyptus globulus* which have heretofore been supplied by Australia, it being found that they can be produced at profit. With this object in view, the company proposes to set out extensive forests of *Eucalyptus*-trees, in order to have at its command a sufficient supply of leaves, the portion of the tree consumed in the manufacture of the oils.

The Egyptian Lotus.—Sir Gardner Wilkinson says of this plant: The *Nymphæa Lotus* grows in ponds and small channels in the Delta during the inundation, which are dry during the rest of the year; but it is not found in the Nile itself. It is nearly the same as our white water-lily. There are two varieties, the white, and that with a bluish tinge, or the *Nymphæa cærulea*. Though the favorite flower of Egypt, there is no evidence of its having been sacred; but the god Nefer-Atum bore it on his head, and the name *Nufar* is probably related to *nofar*, "good," and connected with his title. It was thought to be a flower of Hades or Assiente, and on it also Harpocrates is often seated. He was the Egyptian Aurora, or day-spring; not the god of silence, as the Greeks supposed, but figured with his finger in his mouth, to show one of the habits of childhood of which he was the emblem. Hence he represented the beginning of day, or the rise and infancy of the sun, which was typically portrayed rising every morning from that flower, or from the water; and this may have given rise to the notion of Proclus that the lotus-flower was typical of the sun. The lotus-flower was always presented to guests at an Egyptian party. It is evident that the lotus was not borrowed from India, as it was the favorite plant of Egypt before the Hindoos had established their religion there.

Change in bifoliar Spurs of Pinus.—In a paper lately read at the Royal Botanical Society of Edinburgh, Professor Dickson exhibited specimens of *Pinus sylvestris*, in which some of the ordinary bifoliar

spurs or shortened branches had been stimulated to develop leaves with internodes, as is sometimes seen in the terminal shoots of the larch, thus showing a reversion to the condition which is present in the seedling plants of *P. sylvestris*. He also called attention to the fact that these spurs in *Pinus* fall off bodily after a certain period, from two to five years according to the species, thus approximating, as previously pointed out by Dr. J. Stark (*Trans. Roy. Soc. Edin.*, vol. xxvii., pp. 651–9), to many Cupressineæ, in which the individual leaves do not fall off, but where there is from year to year a shedding of leafy twigs, a phenomenon to which the term cladoptosis has been applied. In the genera *Sciadopitys* and *Phyllocladus* there are no foliage leaves at all in the adult state, these being all reduced to scales, and the function of the leaf performed by cladodes, which are slender and needle-like in *Sciadopitys* and form flat expansions in *Phyllocladus*.

Fir Leaf Wool.—Fir wool is a textile fibre which in Saxony is manufactured out of the needles of the fir-tree, the process being partly chemical and partly mechanical. For this purpose the needles are gathered in spring and summer, when they are young and green, old and withered ones being unsuitable. They are taken into barns, and there dried in a current of air. When dried, they are subjected to a settling and fermenting process similar to that in use for flax. This softens the woody parts and loosens them from the fibre, but the complete separation is only obtained after a lengthy boiling by steam. During this boiling a by-product is obtained in the shape of an oil (fir-wood oil), which is gathered and sold to chemists as a remedy for rheumatism and gout, its properties being similar to those of turpentine. The complete separation of bast and fibre is produced exactly as with flax. The fibre is now passed through a milling machine similar to that in use for woolen cloth, and is then carded and spun like cotton. Generally the carded fibre is mixed with a certain proportion of cotton or wool, and thus a kind of merino yarn is produced, which is worked in the hosiery frames into singlets, drawers, and stockings, these fabrics being then sold as anti-rheumatics and as a preventive of gout. When examined under the microscope the fibre appears as a tube, and striped, and as if covered by a fine network. Goods made of this fibre are sold to a considerable extent in Germany, though they are dearer than the ordinary merino goods.

Thuja gigantea is, among the trees on the north-west coast, the Indian's best friend, for out of its wood and bark he manufactures endless articles of domestic, hunting, fishing, and warlike economy. Most of his canoes are hollowed out of it, at least in Vancouver Island; and there is a case quoted where a canoe made out of *Cupressus Nutkaensis*, in Vancouver, was quite an exception, and indeed the canoe was probably traded from some of the northern tribes, and not of Vancouver manufacture at all. The Indian ropes are also very commonly twisted out of its bark. North of latitude 53° *Cupressus Nutkaensis* takes the place of *Thuja gigantea*, and is applied by the Indians to all the useful purposes of the latter, and to some others in addition. For instance, at the Matlakatlah Mission, on the

coast of British Columbia, in about latitude 54° north, where there are fine groves of it, it is sawn into lumber and sent to Victoria, where it meets a ready sale among the cabinetmakers, as it takes a fine polish and works beautifully. Most of the prettily polished discs and little cylinders used by the Indians in gambling are made either from this wood or from that of *Acer macrophyllum*. It is also valuable for ship- or boat-building. The wood of *T. gigantea* is whitish, but in its fresh state is yellower; hence the name yellow cypress applied to it. It is light, tough, durable and easily worked, and, in addition, has a pleasant fragrance. On this account the Russians about Sitka used to call it *dushnik*, or 'scented wood.' It was at one time exported to China, and returned marked with Chinese characters, which warranted it as "real Chinese camphor-wood," puissant for many purposes, and a sovereign remedy against moths in drawers! In repairing old Fort Simpson, the only log found sound after twenty-one years' trial of those used for under-pinning was a stock of this.—*The Garden.*

Botanical Literature.

Mushrooms of America, Edible and Poisonous. Edited by Julius A. Palmer, Jr. Published by L. Prang & Co., Boston.

This is a collection of twelve colored charts of edible and poisonous toadstools prepared for popular use rather than for students of science. All technical terms are therefore as far as possible avoided. The fungi illustrated are the more common edible species and such dangerous and suspicious ones as might be confounded with those given as esculent. Each chart contains a good description of the fungus or fungi illustrated, and, in the case of the esculent species, the best methods of preparing them for the table. The illustrations are in every case very true to nature, and by far the most accurate of the kind that we have ever seen.

While there is a large number of persons actively engaged in the scientific study of fungi in this country, there are few persons who have studied these plants solely with a view to ascertaining their edible or poisonous properties. Among the few who have done so is the editor of this collection, who has devoted more than ten years to experiment in this field of research. Of his ability to prepare such a work, then, there can be no doubt.

We do not agree with Mr. Palmer that the terms "mushroom" and "toadstool" "are both applied with equal reason to any fleshy fungus," and that they should be used as synonyms, "like the corresponding terms 'plant' and 'vegetable,' or 'shrub' and 'bush.'" Toadstool is a very useful general designation for fungi of the order Agaricini and the genus *Boletus*, but the name mushroom should be restricted to *Agaricus campestris*, to which it was transferred in early times from another edible species, *Agaricus Georgii*, Fr. (*A. Mouceron*, Secr.) Should these charts receive a welcome from the public, it is the intention of the publishers to furnish a supplement, from time to time, under Mr. Palmer's supervision, until the illustrations comprise all or nearly all of the edible fungi of America.

Bulletin of the Iowa Agricultural College, issued by the Department of Botany, Nov. 1884. Charles E. Bessey, Ph.D., Professor of Botany. 8vo, pp. 174.

A Revision of the North American Melicæ. By F. L. Scribner. 8vo., pamph., pp. 10, with one plate. From *Proceedings* of Philada. Acad. Nat. Sciences.

Thirty-fifth and Thirty-sixth Annual Reports on the State Museum of Natural History. By the Regents of the University of the State of New York. (Containing the Reports of the Botanist, Chas. H. Peck) Albany: Wells & Parson Co. 1884.

Recherches anatomiques sur les organes végétatifs de l' Urtica dioica, L. Par A. Gravis, Bruxelles: Librairie Médicale et Scientifique de A. Manceux, 1885. 4to, pp. 234, plates 23.

Catalogue of Musci and Hepaticæ of North America, north of Mexico. Arranged by Clara E. Cummings (of Wellesley College) Natick, Mass: Howard & Stiles. 1885. 8vo, pamph. pp. 24.

Proceedings of the Torrey Club.—The regular meeting of the Club was held Tuesday evening, May 12th, the President in the chair and twenty-four persons present.

Mr. Schrenk exhibited mounted specimens of the seeds of *Impatiens fulva* having three cotyledons. Dr. Britton exhibited some flowers of *Gaylussacia resinosa* and *Andromeda Mariana*, which were greatly enlarged through the hyphæ of an *Exobasidium*.

Dr. Kunzé exhibited a growing specimen of a large-bulbed species of *Ornithogalum* from Cape Colony. Mr. E. P. Bicknell read some notes upon cleistogamy in *Lamium amplexicaule;* Dr. Newberry presented a note upon derivation in *Pinus edulis* and *P. monophylla;* and Dr. Britton read a description of a new variety of *Veronica Anagallis*, and exhibited numerous dried specimens of it from various localities.

Four persons were elected active members, and one, a corresponding member.

At the regular meeting held Tuesday evening, June 9th, the President occupied the chair, and twenty-one persons were present.

Reports upon the field excursions that had been held were made by various members who had participated in them.

Mr. Schrenk showed young plants of *Impatiens fulva* with three cotyledonary leaves.

Dr. Newberry made some remarks upon the fossil flora of the Berea Grit of Ohio, and exhibited specimens of a *Lepidodendron* and *Spirophyton* belonging thereto. In regard to the drift of Ohio, Dr. Newberry said that a remarkable feature was the quantity of red-cedar wood scattered through it, much of which retained its well known fragrance and color.

On motion, the Club adjourned to the second Tuesday in September.

Fig 1

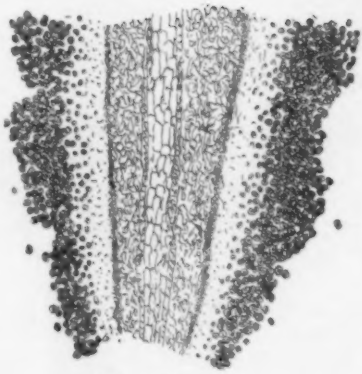

Fig 2

Fig. 3

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

Vol. XII. New York, July, 1885. **[No. 7.**

The Genus Cintractia.

By WILLIAM TRELEASE.

(Plate L.)

In the Southern States and West Indies, species of *Cyperus* and *Fimbristylis* and, perhaps, other Cyperaceæ are attacked by a rare smut which forms compact, black, fusiform swellings in their flower-stalks. This fungus was named *Ustilago axicola*, by Berkeley, in an enumeration of fungi from San Domingo, published in the *Annals of Natural History* for March 1852. A variety is mentioned in *Grevillea*, iii., p. 59. Specimens from the Kew herbarium have been more recently studied by Cornu, who found the mode of fruiting so unlike that of other species of *Ustilago* that this species was made the type of a new genus called *Cintractia* in honor of a French botanist by the name of Cintract.*

This genus, which has a close affinity with *Testicularia*, possesses a persistent mycelium, which may be seen in the form of delicate, colorless threads in the central portion of the peduncle and other diseased parts, below the surface of which it becomes aggregated into a compact, gelatinous stroma, from the outside of which spores are successively differentiated, so that the innermost are always young and pale, while the outer spores, which are at first held together by the remnants of the stroma, deepen in color and gradually separate as they mature.

Specimens of *C. axicola* (B.), on *Fimbristylis*, collected in Cuba by Wright, and preserved in the Curtis herbarium under the number 721, for which I am indebted to Professor Farlow, agree in all essentials with the description drawn by Cornu from a specimen on *Cyperus*. In both, the mycelium forms a compact, dark-brown stroma, which surrounds the medullary and fibro-vascular portion of the stem, and is produced outward in a series of tapering ridges of the same color, between which the fertile hyphæ form wedge-shaped masses of spores that, when mature, are nearly spherical, smooth and of a deep brown color, and measure 12–18μ, the most usual size being about 14μ.

On the receipt of Cornu's paper, I was struck by the resemblance of a smut on *Juncus tenuis* to *Cintractia axicola*. This species,

* Maxime Cornu: Sur quelques ustilaginées nouvelles ou peu connues, in *Annales des Sciences Naturelles*, Botanique $\frac{6}{15}$, p. 277–279, pl. 15, fig. 1–3.

which forms rather firm, black sori about the peduncles, on the divisions of the perianth, etc., (Fig. 1) was named *Ustilago junci* by Schweinitz, in his Synopsis of North American Fungi, No. 2,816. As in the preceding species, its mycelium persists within the diseased parts of the host, though it is usually less abundant in the pith. Outside of the fibro-vascular bundles it becomes denser, forming a continuous, gelatinous stroma, which is colorless except for a narrow, yellowish band near its outer edge (Fig. 2). The outermost cells of this stroma are uniformly fertile, so that its entire outer portion passes into a mass of young spores that are gradually pushed outward as they mature (Figs. 2–3). At first the sori are covered by the epidermis, which renders them lead-colored. After its disappearance the mass of spores appears intensely black, and gradually crumbles away. The mature spores, as seen singly, are of a dark brown color and rather opaque. They are minutely granulated, irregularly rounded or ellipsoidal in form, and measure 12–15 x 14–21 μ.

In the successive production of spores from a fertile stroma, this species closely resembles the last. It is evidently referrible to the same genus, and should bear the name *Cintractia junci* (Schw.) It differs from the other species in the character of its spores, which are darker, more angular, often elongated and minutely roughened, as well as somewhat larger, and in possessing a nearly colorless stroma, the entire outer surface of which is sporiferous and destitute of the sterile rays characteristic of *C. axicola*.

Spores of *C. junci* germinate readily in water while fresh, each emitting a colorless filament 1.5 μ in diameter, which reaches a length of several millimetres within a few days in cell cultures. The refractive protoplasm which at first fills it passes toward the end as it grows, leaving the basal part empty. The formation of sporidia on these threads has not been observed. Similar hyphæ which are to be found in abundance in the outer portion of sori that have been exposed to rain or allowed to remain damp in the press are presumably of the same nature, though they have not been traced to the spores.

This species is found on *Juncus tenuis* in New York (Sartwell, *fide* Berkeley in *Grevillea* iii., p. 59; Howe, *fide* Peck in 22d Report on N. Y. Cabinet, p. 93), North Carolina (Curtis, Plants of N. C., p. 123), Iowa (Bessey, Bulletin Iowa Agl. College, Nov., 1884, p. 145; Arthur, *l. c.*, p. 172) and Wisconsin (Trelease, Parasitic Fungi of Wis., No. 252.) It is distributed from New Jersey by Martindale in Ellis's North American Fungi, No. 290; and I have also collected specimens in that State. As a rule, nearly every inflorescence will be attacked on a given stool of the host, while other plants immediately about it remain entirely free.

DESCRIPTION OF PLATE L.—1. Inflorescence of *Juncus tenuis* attacked by *Cintractia junci* (Schw.); natural size. 2. Longitudinal section through the lower part of a smut sorus, in the peduncle of the same plant, showing the stroma and spore-mass on either side of the nearly unaltered inner tissues of the plant (x70). 3. Fragment of a cross-section through a similar sorus, showing the mode of formation and maturation of the spores on the outside of the stroma (x400).

·ASA·GRAY·
·M·D·C·C·C·LXXXIV·
R.L.

Bronze Medallion Portrait of Dr. Gray.—We present on the preceeding page, from *Science*, an engraving of an admirable bronze medallion of Dr. Asa Gray, by Saint Gaudens, a gift to Harvard College from some of the doctor's friends and associates.

"It is an excellent likeness of our distinguished botanist, and a fine specimen of the artist's peculiar work. It has the earnestness and geniality of expression which the passing years seem to impress more forcibly upon Dr. Gray's countenance; and the artist has so wrought the stubborn material as to impart grace and apparent flexibility to the flowing locks. This admirable work of art, representing, as it does, in so thoroughly an artistic manner, one of the leading scientific men of America, will be worthily placed upon the walls of the college halls, with which his name and fame will be forever associated."

Sabal umbraculifera.—In Notes on the Winter Flora of Bermuda (Vol. xii., p. 47) I notice Mr. Kemp gives *Sabal umbraculifera* as one of the distinguishing features of the flora of Bermuda. As this palm is a native of the hottest parts of Jamaica (Lat. N., 18), I was much surprised to find it naturalized so far north as Bermuda (Lat. N., 32). On turning, however, to the Botany of Bermuda, by General Sir John H. Lefroy, I find he gives *Sabal Palmetto*, the palmetto of the Southern States, as the universal palm of Bermuda, and does not mention *S. umbraculifera* at all. Hence I think Mr. Kemp has by inadvertence given the latter for the former palm. This is an important point in geographical botany, for it would have been a singular instance of the hardihood of a plant which here lives under all the conditions of a coco-nut palm, but said to flourish and become universal when the latter had only a struggling existence.

Gordon Town, Jamaica. D. MORRIS.

Kalmia as a Tonic.—I note in the BULLETIN for May, 1885, the mention of *Kalmia angustifolia* being used as a tonic by Indians. Why not, even if it possesses the poisonous properties of its congener *K. latifolia*—which it most assuredly does—as far North as Nova Scotia? It kills lambs in the spring there, when but little other herbage has commenced growth, hence its name "lamb-kill." This I have verified by three years observation in that country. But why surprise should be excited at its use as a tonic I am at a loss to imagine, when some of our best tonics contain arsenic and nux vomica.

Gordon Town, Jamaica. J. HART.

(But arsenic and nux vomica are not remedies among the *Indians*, and we presume that the surprise of the author of the note alluded to was that a plant reputed as poisonous should be used by *them* as a tonic. Of course, among civilized peoples the selection of deadly drugs as remedies is of so common occurrence as to excite no comment.—ED.)

The Word Savoyanne.—In the article upon *Coptis*, in the Drugs and Medicines of North America, the editors say: "In French towns in Canada, we are informed by Dr. Mignault, it [*Coptis*]

is known among the people under the name of *savoyanne*, from some old plant of France. It is sold in all the French markets, and is extensively used in domestic medicine as a tonic and appetizer. Don Miller states that it is known as *tisavoyanne* by the Canadian French." In a foot-note, Dr. Chas. Rice says: "There is no doubt in my mind that the syllable 'savoyanne' is a dialectic adjective of the name of Savoy (once a French province.) . . . The syllable *ti* may be a patois for the name of the plant, or some other corruption. . . . It would be quite natural for persons who call madder the *red Savoy* 'ti' (whatever this may mean) to call gold-thread or *Coptis* the *yellow Savoy* 'ti'. The names were, of course, carried by settlers to Canada."

These conjectures fall very short of the mark. The Canad. Fr. *tisavoyanne* (abbreviated to *savoyanne*), far from being an importation from France, is of Indian origin, and corresponds to Micmac (Algonkin) *tissaɷhianne**, 'skin-dye' (Cree *atisâweyân*), which, like Cree *atisigan*, Odjibway *adissigan*, Shawnee *hâtethikâkh*† (words meaning 'dye-stuff'), is from the root *ati*, 'to color.' These are general names for such plants as yield these tribes a dye-color.

Kalm tells us that the leaves and stalks of the *Coptis* were used by the Indians of Canada for giving a fine yellow color to several kinds of articles that they made of prepared skins. The French learned the plant's tinctorial property from the Indians, and used it for dyeing wool and other materials. Hence the Algonko-French name *tisavoyanne jaune*, in contradistinction to *tisavoyanne rouge*, a name for *Galium boreale*, L., and *G. trifidum*, L., var., *tinctorium*, Gray, the roots of which were (and are still) used by the Indians for staining their porcupine quills red, and by French women for dyeing their clothes.

I notice that *savoyan* appears in the catalogues of some of our dealers in herbs as a popular name for *Galium Aparine*, L. The name has been transferred from the two species of *Galium* just mentioned.

W. R. GERARD.

The Botanical Club of the A. A. A. S. will hold its meeting during the week August 26th to September 2d at Ann Arbor, Mich., as an adjunct of the American Association. Any member of the Association who takes an interest in botany is eligible to membership in the Club. The only other requirement is that of registration, which should be attended to immediately after registering for the Association. The Club is tendered an afternoon excursion by carriage to the most interesting collecting grounds in the vicinity. The long excursion on Saturday will be so managed that botanists can spend some time in herborizing. If a sufficient number desires it, a trip can be arranged at small expense to Cedar Lake, a few hours ride by rail from Ann Arbor, where there is one of the few remaining

* As written by French missionaries.

† These Indians speak with a lisp, a spirant *th* replacing the sibilant *s* of the other Algonkin dialects.

tracts of white pine that represents all that is left of one of the most magnificent pine regions of the continent. The excursion to the island of Mackinac and Sault Ste. Marie after adjournment will be especially attractive to botanists. Most of the prominent western botanists will be in attendance at this meeting, and many others from all parts of the country. No botanist should willingly miss so good an opportunity to become acquainted with his co-laborers and to obtain the inspiration to be secured through personal associations.

J. C. ARTHUR,
Secretary of Botanical Club of A. A. A. S.

Dr. Franklin B. Hough.—Science, especially botany and forestry, has lost an illustrious worker in Dr. Franklin B. Hough, who died at his residence in Lowville, New York, on the 9th of June, in his 63d year—he having been born at Martinsburg in Lewis County, New York, on the 20th of July, 1822. He practiced medicine in Somerville from 1838 to 1842, and continued to cultivate his natural taste for literary, historical and statistical work. In 1847 he published an account of the flora of Lewis County, which was so well received by the botanists of that day that he received his first scientific honors soon after by being elected a correspondent of the Academy of Natural Sciences of Philadelphia, which has been followed since by his election to some thirty-six other scientific or literary bodies. His statistical and historical labors, especially in connection with his own native State, have been enormous.

Dr. Hough, as a member of the American Association for the Advancement of Science, was a prime mover in the action of that body, which did so much to make the modern phase of forestry a national question; and when, in response to this movement, the national government undertook an investigation of the forestry question, Dr. Hough was placed in charge of the matter under the supervision of the Department of Agriculture. His reports in connection with this are models of pains-taking industry in the collection of facts. It was in just such work that his talent showed to advantage. It was always charming to engage him in conversation in connection with the history of any of our common studies. Anecdotes connected with men and things, with a ready recollection of dates and incidents, would be freely communicated with an easy freshness truly remarkable.

During the winter he was engaged at Albany in drafting, and watching through its various stages, the Forestry Bill which has since become the law of that State. He still contrived to work on other literary subjects that were quite enough for one man's time. It is believed this weakened his hitherto iron constitution, and brought on an attack of pneumonia about the beginning of April. After four weeks he seemed well enough to be removed to his home at Lowville, but only eventually to succumb.—*Gardeners' Monthly.*

Botanical Notes.

Origin of the Lombardy Poplar.—According to Mr. Bossier, a botanist who has lately studied oriental botany, this poplar is a dis-

tinct species, which he calls *Populus pyramidalis*. It is believed by the best authorities to have originated in Persia ; some writers, on the other hand, state that it is truly indigenous to Italy, but the evidence, however, we think is strongest in favor of Persia, from whence most probably it was introduced into Italy, where it is now a favorite tree and extensively grown. Lord Rockford has the credit of having imported this Poplar into England, by means of cuttings brought from Turin in the year 1758. The original trees raised from those cuttings are supposed to have been planted at Blenheim, in Oxfordshire.—*Garden.*

Trees of the United States.—There has recently been placed on exhibition, at the New York Museum of Natural History, an almost complete representation of the trees of the United States, between 400 and 500 trunk sections of the different species. These specimens are about five feet eight inches long each, cut in such manner as to display their barks and the transverse and longitudinal sections of the wood. This is done by cutting away one side of each specimen at the top to the depth of one-half the diameter of the trunk and for one-third of its length. One-half of each exposed portion is polished to illustrate the effect of this treatment of the wood, the remainder being left in the natural condition, with the top of the upper divided part finished by beveling. In the case of trees of commercial importance this form of representation is supplemented by carefully selected planks, or by burls, showing better than the logs the true industrial value of the wood. Among specimens of this kind is a plank of redwood (*Sequoia sempervirens*), measuring 8½ feet in width. A species remarkable for slow growth, and which is only 24 inches in diameter, shows an age of 410 years, being the oldest tree in the collection. This is *Picea Engelmanni*, named for its discoverer, Dr. Engelmann, and known also as Engelmann's spruce. Another example of slow growth is seen in *Pinus edulis*, or edible pine, from Arizona, called also nut-pine. The seed of this pine, which resembles a good-sized bean, is used by the Indians for food. A tree of this species which is 300 years old measures only 15 inches in diameter. Another specimen, which is 341 years old, shows a diameter of 37 inches. It is the western shell-bark hickory (*Carya sulcata*), from Allenton, Mo. The same locality is represented by a specimen of *Tilia Americana*, or basswood, which is 40 inches in diameter, and 150 years old.

This valuable collection, numerically exceeding that made in connection with the census reports, includes examples of many curious and interesting species, of which probably the complete natural series could never have been viewed in their native soil by any single traveller, however diligent.

Among the extraordinary specimens is a representative of Texas. This is the *Cereus giganteus*, which resembles a fluted column. It is a plant which can be readily taken all to pieces. Its component parts are in the form of vertical sections of twisting curvatures in the line of their circumference, whereby one portion is fitted exactly to another. They can be separated without the slightest difficulty, in the absence of any heart at the centre for their attachment. The

Washington palm (*Washingtonia filifera*) from Southern California is also curious. The specimen includes the top of the tree, which is severed from the body, and bears its dried and yellow wide-spreading leaves. Its peculiarity is in the ring formations of the trunk, which are almost wholly detached from each other, standing one within another like a succession of forms of bark. They are easily detached from each other.

The cocoanut-tree from Key West and the finely odorous nutmeg-tree from Calitornia are among other specimens of importance. The catalpa is represented as a species most remarkable for its durability. Some of this wood known to have been buried in the earth for seventy-five years has been brought out in perfectly sound condition. Specimens of beautiful woods are seen in the arbutus, sweet bay (*Persea Carolinensis*), Alaska cedar (*Chamæcyparis Nutkaensis*), and the beautifully figured maple burl from Missouri.

With only seven unimportant exceptions, the specific gravity, ash, and fuel value of the wood of every indigeneous aborescent species of the United States have been scientifically determined. The specific gravity was obtained by weighing carefully measured specimens 100 millimetres long and about 35 millimetres square, previously subjected to a temperature of 100° until their weight became constant. The ash is given in percentages of dry wood, which were determined by burning small blocks of the wood in a muffle furnace at a low temperature. The relative approximate full value of any wood is obtained by deducting its percentage of ash from its specific gravity. The correctness of the result thus found is based npon the hypothesis, first proposed by Count Rumford, that the value of equal weight of all woods for fuel is the same, which is considered to be approximately true.—*Scientific American.*

Origin of the Cereals.—Recent numbers of *Naturen* contain interesting papers, by Prof. Schubeler, on the original habitat of some of the cereals, and the subsequent cultivation in the Scandinavian lands and Iceland of barley and rye more especially. It would appear that barley was cultivated before other cereals in Scandinavia, and that the generic term "corn" was applied among Northmen to this grain only, from the oldest times, and that in the Norwegian laws of the seventeenth and eighteenth centuries, wherever reference was made to "*kornskat*"—or standard by which land in the Northlands was, and still is, rated in accordance with the corn it is capable of yielding—the term was understood to apply to barley. Proof of the high latitude to which the cultivation was carried in early ages is afforded by the Egil's Saga, where mention is made of a barn in Helgeland (65° N. Lat.) used for the storing of corn, and which was so large that tables could be spread within it for the entertainment of 800 guests. In Iceland, barley was cultivated from the time of the colonization, in 870, till the middle of the fourteenth century, or, according to Jon Storrason, as lately as 1400.

From that period down to our own times barley has not been grown in Iceland, with any systematic attention, the islanders being dependent on the home country for their supplies of corn. In the last century, however, various attempts were made both by the Dan-

ish government and private individuals to obtain home-grown corn in Iceland, and the success with which these endeavors were attended gives additional importance to the systematic undertaking which has been set on foot by Dr. Schubeler and others within the last three years for the introduction into the island of the hardier cereals, vegetables and fruits. As many as 382 samples of seeds of ornamental and useful plants most of which were collected from the neighborhood of Christiania, are now being cultivated at Reykjavik under the special direction of the local government doctor, Herr Schierbeck, who succeeded, in 1883, in cutting barley ninety-eight days after the sowing of the seed, which had come from Alten (70° N. Lat.). And here it may be observed that this seems the polar limit in Norway for anything like good barley crops. The seed is generally sown at the end of May, and in favorable seasons it may be cut at the end of August; the growth of the stalk being often 2½ inches in twenty-four hours. North of 60° or 61° barley cannot be successfully grown in Norway at more than from 1,800 to 2,000 feet above the sea-level. In Sweden, the polar limit is about 68° or 66°, but even there, as in Finland, night frosts prove very destructive to the young barley.

In some of the field valleys of Norway, on the other hand, barley may, in favorable seasons, be cut eight or nine weeks after its sowing, and thus two crops may be reaped in one summer. According even to a tradition current in Thelemarken, a farm there owes its name, *Triset*, to the *three* crops reaped in the land in one year!

Rye early came into use as a breadstuff in Scandinavia, and in 1490 the Norwegian Council of State issued an ordinance making it obligatory on every peasant to lay down a certain proportion of his land in rye. In Norway the polar limit of summer rye is about 69°, and that of winter rye about 61°; but in Sweden it has been carried along the coast as far north as 65°. The summer rye crops are generally sown and fit for cutting about the same time as barley, although occasionally, in Southern Norway, less than ninety days are required for their full maturity.—*Nature.*

The Prickly Pear.—In some recently published Consular reports of the United States the following paragraph on the nopal, or prickly pear (*Opuntia cochinillifera*) occurs:—"The plant abounds in the whole territory of Mexico, Texas, New Mexico, Arizona and California, and extends much farther north. It has flat oval leaves, about six inches long and nearly half an inch thick, covered by long sharp thorns, and bears a fruit of a purple color resembling a pear, filled with numerous small seeds. The plant grows from three to six feet high. Its fruit is eaten freely by cattle, and the leaves, after having been burnt in a fire to get rid of the thorns, are thrown by the cartmen in place of fodder to their oxen by means of a long, sharp-pointed stick, especially when on a road where there is no grass. It also makes an excellent hedge, and once planted will last forever. There is another species of nopal called *nopal de castilla*, which has no thorns, and which is cultivated for the sake of its fruit. This nopal has much larger leaves than the wild species, and grows to the height of ten and twenty feet, and the fruit is much

larger. Of this species there are a great many different kinds, each having its distinct name. They are of different colors—green, red, yellow, white and purple. The fruit is delicious, and in the interior of Mexico forms one of the principal means of sustenance for the inhabitants. From the purple tuna a liquid is made called *colonche*, and a sort of sweet cheese (*queso de tuna*). There is a small red tuna growing wild in the mountains near to Zacatecas, called cardona, which is highly prized on account of its fine flavor and digestible qualities, and several cartloads of which are sold daily in Zacatecas. They are sold at six cents for four dozen. Besides serving as food for men and beasts its leaves form the food of the cochineal insect.

The Tomato.—"In the United States its introduction preceded by many years its use as we at present know it. It is said to have reached Philadelphia from St. Domingo in 1798, but not to have been sold in the markets until 1829. It was used as an article of food in New Orleans in 1812. The first notice of it in American gardens was apparently by Jefferson, who notes it in Virginia gardens in 1781. It was introduced into Salem, Mass., about 1802, by an Italian, but he found it difficult to persuade people even to taste the fruit. Among American writers on gardening, McMahon, 1806, mentions the tomato, but no varieties, as 'in much esteem for culinary purposes'; Gardiner and Hepburn, 1818, say: 'make excellent pickles'; Fessenden, 1828, quotes from Loudon only; Bridgeman, 1832, says, 'much cultivated for its fruits in soups and sauces.' They were first grown in Western New York in 1825, the seed from Virginia, and in 1830 were not produced by the vegetable gardeners about Albany; yet directions for cultivating this fruit appeared in Thorburn's Gardeners' Kalendar, 2d. edit., New York, 1817. Buist writes that as an esculent plant in 1828–29 the tomato was almost detested, yet in ten years more every variety of pill and panacea was 'extract of tomato.' Mr. T. S. Gold, Secretary of the Connecticut Board of Agriculture writes me that 'we raised our first tomatoes about 1832, only as a curiosity, made no use of them though we had heard that the French ate them. They were called love-apples.' D. J. Browne, 1854, describes six varieties and says: 'the tomato until within the last twenty years was almost wholly unknown in this country as an esculent vegetable.' In 1835 they were sold by the dozen in Quincy Market, Boston. In the *Maine Farmer*, Oct. 16th, 1835, in an editorial on tomatoes, they are said to be cultivated in gardens in Maine, and to be 'a useful article of diet, and should be found on every man's table.' In a local lecture in one of the Western colleges about this time, a Dr. Bennett refers to the tomato or Jerusalem apple as being found in the markets in great abundance, and in the *New York Farmer* of this period one person is mentioned as having planted a large quantity for the purpose of making sauce. In 1844 the tomato was now acquiring that popularity which makes it so indispensable at present, writes R. Manning." From this it appears "that the esculent use of the tomato in America does not antedate the present century, and only became general about 1835 to 1840."—**Dr. E. L. Sturtevant, in *Amer. Naturalist.***

The Ailantus.—An English exchange says: Many complaints have been made of the overpowering and offensive odor of the flowers of the *Ailantus* trees planted in the streets of Paris and other large cities. According to Mr. E. André, it is only the flowers of the male trees which exhale this unpleasant scent, and he recommends that none but female trees should be for the future planted in public or other places where the peculiar odor of the males might be offensive. This would seem an important point for Americans and others who plant the *Ailantus* largely as a street tree."

The fact pointed out by Mr. André belongs to the domain of ancient history in this country.

A Large Poplar.—In the Botanical Garden at Dijon there is a poplar of colossal dimensions (species not stated) to which Mr. Joly devotes a note in the *Journal de la Société Nationale d'Horticulture.* The height of this tree is 130 feet. Its circumference near the earth is 46 feet, and, at 16 feet above the earth, 21 feet. Its bulk is now 1,590 cubic feet, but six years ago, before the fall of one of the large branches, it was 1,940. From some historic researches made by Dr. Lavelle, and a comparison with trees of the same species in the vicinity, it has been pretty well ascertained that this poplar is at least 500 years old.

Unfortunately, it is now completely hollow up to the point whence the large branches spring. All the dead portions have been removed, and the interior has been filled in with beton.—*La Nature.*

Origin of the Name Tillandsia.—The long moss was named *Tillandsia* because of its aversion to water. Linnæus says he named it after a professor at Abo, who, in his youth, having an unpropitious passage from Stockholm to that place, no sooner set his foot on shore than he vowed never again to venture upon the sea. He changed his original name to Tillands, meaning (in Swedish) 'by land.' Afterwards, having occasion to return to Sweden, he took a circuitous journey of 200 Swedish miles through Lapland to avoid going eight miles by sea.—*Garden.*

Ginkgo.—According to Mr. B. S. Lyman (in *Science*), *ginkgo*, the usual orthography of the popular name for *Salisburia adiantifolia*, is due to a misprint in Kæmpfer's Amœnitates Exoticæ. In order to agree with the pronunciation as heard in Japan, the word (which means 'silver apricot,' or 'silver almond') should be written *ginkĭyoo* (the *g* hard, and the two *o's* long.) *Ginkiyoo* is the name of the fruit, the tree itself being called *ichoo* (*ch* soft and the *o's* long, as before.) Mr. Lyman says: "The juice of the thick pulp outside the nut is very astringent, and is used in making a somewhat waterproof, tough paper, and a preservative black wash for fences and buildings. The meat of the nut is cooked and eaten."

Botanical Literature.

The Microscope in Botany. A guide for the Microscopical Investigation of Vegetable Substances. From the German of Dr. Julius Wilhelm Behrens. Translated and edited by Rev. A. B. Hervey, A.M., assisted by R. H. Ward, M.D., F.R.M.S. Illustrated

with 13 plates and 153 cuts. Boston: S. E. Cassino & Co., 1885. 8vo, pp. 466.

This is a work which should be in the hands of every botanist who is interested in investigations into the deeper problems of plant-life. The first two chapters are devoted to brief descriptions of the microscopical apparatus necessary for his purposes, with directions for using them, and to the manner in which microscopical work should be performed. The translators have substituted descriptions and figures of American instruments for those of the Continental style described in the corresponding chapters in the German edition, inasmuch as the foreign apparatus are comparatively unused and unavailable in this country.

The third chapter contains very full directions for the preparation of microscopical objects. The fourth and fifth chapters are devoted, respectively, to microscopical re-agents and microscopical investigations of vegetable substances. In these two chapters, which constitute the most valuable portion of the work, the student will find a very large number of facts and hints that will aid him greatly in the practical performance of those delicate manipulations that he will be obliged to master before he can become an expert in the histological investigation of plants.

The book is very handsomely printed, and the illustrations are both numerous and excellent.

Canadian Filicineæ. By John Macoun, M.A., F.L.S., and T. J. W. Burgess, M.D. 4to, pp. 64. From *Transactions* of the Royal Society of Canada.

Note sur la Division des Noyaux dans le Tradescantia Virginica. Par E. Bernimoulin de l' Institut Botanique de l' Université de Liége. From the *Bulletin* de la Societé Royale de Botanique de Belgique.

A Catalogue of the Phænogamous Plants at present known to grow without cultivation in the State of Connecticut. By James N. Bishop. 8vo, pamph., pp. 18. Hartford, Conn., 1885.

Catalogue of the Phænogamous and Vascular Cryptogamous Plants found growing in Meriden, Conn. By Emily J. Leonard. In *Transactions* of the Scientific Association of Meriden. Vol. i., 1884, pp. 40.

A descriptive Catalogue of the Grasses of the United States, including especially the Grass Collections at the New Orleans Exposition. By Dr. Geo. Vasey, Washington: Gibson Bros. 1885. 8vo, pp. 110.

Notizie sulla Agricoltura in Italia da servire come Illustrazione alle Raccolte inviate dal Ministero di Agricoltura alla Esposizione Universale di Anversa nell' anno 1885. Roma: Tipografia Fratelli Centenari. 1885. 8vo, pp. 141.

Correction.—On page 60, line 14, *Farsetia* should be substituted for *Marrubium.*

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

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Pinus edulis and P. monophylla.—On reading Dr. Newberry's note on these trees (BULLETIN, p. 50), it occurred to me that I might have placed more value on the monophyllous character as a specific distinction than it deserved. Having plants of both of some age growing on my grounds, and growing within a few score feet of each other, I thought to watch them closely this summer. The result is, I think Dr. Newberry's views correct. The observation led to some interesting facts which may be worth placing on record.

Dr. Newberry believes the *P. monophylla* is "a somewhat dwarfed and depauperate form" of *edulis*. That this is correct is evidenced by the tendency to produce free leaves, which, as I showed in my paper on Adnation in Coniferæ, published some years ago in the Proceedings of the Chicago meeting of the American Association for the Advancement of Science, is evidence of a decline in vegetative vigor and attendant on depauperate forms.

In closely examining the young monophyllous growth early in the season, I found that by a light tap at the apex it divided and gave the two leaves of *P. edulis*. It is evident that the plant is only monophyllous from the want of power, by reason of its depauperate condition, to burst the membrane enveloping the fascicle in its early stages. It would scarcely do to claim a specific character for a condition which depends for its existence on a membrane so slight as this. It occurred to me then to examine the young growth of other species of pine, and I think I may almost say that, "as a general rule, all pines are monophyllous in the early stages of growth"; at least the divisions of the fascicle are held together by a thin membrane which is ruptured by a tendency to recurve from the apex. The extreme point of the fascicle is free, and, with the tendency to recurve, division follows. On a vigorous specimen of white pine, about seven feet high, I found a very large number of monophyllous bundles—as many as ten on one growing branch. A light tap on the apex, as in the case of *Pinus monophylla*, separated the sections. It was my thought to send the results of my observations then, but concluded to wait to see how long these bundles would retain the monophyllous character. Little by little they split apart, till to-day there is but one left, so far as I can find. It is evident that, with a slightly weakened power to expand from the apex, the white pine might present a monophyllous form.

Another interesting fact, though not connected with the main purpose of this note, is that the free apex of the monophyllous bundle shows it to be composed of three leaves, each a trifle shorter

than the other. This indicates that a fascicle of pine-leaves is a depressed spiral, and that the "needles" are true leaves and not modifications of branches, as I was once inclined to believe. The bundle of "needles" is but an arrested branch, having a dormant bud at the apex, and which may even push and make a shoot in after years, as I have observed of late in Scotch pines that have been headed back. I send some fascicles that have been forced into growth from a three-year-old branch. The leaves of the pine may properly be said to proceed from hidden spurs.

THOMAS MEEHAN.

The Growth of Trees.—The appearance of lateral and terminal buds upon the new growth of trees and shrubs indicates, of course, the cessation of longitudinal growth for the season. Subsequent vegetative efforts are directed to the lignification of the tissues thus formed. The time occupied with this preliminary extension of growth is short as compared with that of its after development.

In the summer of 1884, in South-western New York, at about latitude 41° 21′, I noted the dates when the common woody plants had formed their buds. The results were rather surprising, though of course the observations are not to be considered as new or original. Collectively, however, they call attention to a condition of the growth not generally recognized.

As soon as June 1st the following trees and shrubs had formed both lateral and terminal buds: *Tilia Americana*, L., *Acer saccharinum*, Wang., *Acer rubrum*, L., *Hamamelis Virginica*, L., *Amelanchier Canadensis*, L., *Sambucus pubens*, Michx., *Kalmia latifolia*, L., *Ulmus Americana*, L., *U. fulva*, Michx., *Carya alba*, Nutt., *Quercus alba*, L., *Q. bicolor*, Willd., *Q. Prinus*, L., var. *monticola*, Michx., *Q. coccinea*, Wang., and *Fagus ferruginea*, *L.*, *Populus tremuloides*, Michx., and *Fraxinus Americana*, L. Fifteen days later these were added to the list as having completed their longitudinal growth for the season: *Prunus Cerasus*, L., *Juglans nigra*, *L.*, *Ostrya Virginica*, Willd., *Carpinus Americana*, Michx., *Betula lenta*, L., *Castanea vesca*, L., *Morus rubra*, L., *Lindera Benzoin*, Meisner.

July 19th, terminal and lateral buds were found on *Staphylea trifolia*, L., *Nyssa multiflora*, Wang., *Andromeda ligustrina*, Muhl., and *Alnus incana*, Willd.

These dates were fixed, not upon single, but, upon several specimens of each species. Some other species continued to grow throughout the season, or at least until near its close, without producing terminal buds. The more prominent of these were *Liriodendron Tulipifera*, L., species of *Vitis*, *Ampelopsis quinquefolia*, Michx., *Celastrus scandens*, L., species of *Rhus*, etc.

In this latitude, most trees and shrubs put forth their leaves from the 1st to the 15th of May, although the Cupuliferæ are rather behind this date. It seems, therefore, that our hardiest and most valuable deciduous forest trees, the oaks, maples, hickories, elms, birches, ashes, and the beech and aspen produce all their annual growth *in extension* in from three to six weeks from the date when growth commences. The remaining three months, more or less, are devoted to

the ripening and maturing of this growth. It is as if the framework were pushed forward with the greatest possible rapidity, while the strengthening and finishing followed at a more leisurely pace. It is easy to see why the species which first complete this stage of growth should produce the hardest and strongest tissue, while those which go on pushing out their shoots indefinitely are more or less damaged by the winter weather.

Mass. Exper. Station, Amherst. WINTHROP E. STONE.

Verbascum Lychnitis.—Somebody, I cannot remember where or when, put it into my mind that *Verbascum Lychnitis* was "probably a hybrid" between *Verbascum Thapsus* and *V. Blattaria*. The plant has been known in the old world for ages, and, if a hybrid, it would be interesting to know that it has taken rank as a species, and been able to hold its own so long all over the world. So many statements have been started as actual facts that were introduced only as probabilities that I generally feel it does no harm to go over with an examination again whenever opportunities offer. I cannot find anywhere in print that a hybrid origin has been ascribed to this species (but it has been on my mind from some authority), and as the plant and its supposed two parents are all common hereabouts it has long been my desire to test what hybridization would result in. Now it is on record that *V. Lychnitis*, though it may not be in itself a hybrid, takes liberties with other species. Dr. Gray, in the Manual, 5th edition, says "hybridizes spontaneously with the common mullein." The Doctor does not say whether this is or not his own experience, but probably founds his statement on a paragraph in Willdenow's Species Plantarum, which notes that a plant which was thought worthy of being made a species, *V. thapsiforme*, appeared in a bed of *Lychnitis* plants in the Upsal Garden, in 1761, and the female parent was supposed to be *V. Lychnitis*, and the male parent *V. Thapsus*. Similar other specimens had, however, been sent by Bauhin and others. But by what we now know of natural variations and sports, this will not be regarded as decisive evidence of spontaneous hybridization. The three kinds grow freely together here, but I never saw any tendency to produce the form that appeared in the Upsal Garden. The spontaneity is certainly not active in this district.

I commenced testing the hybrid origin of *V. Lychnitis* years ago. It takes several years to get the results of work of this kind, so it is important to be sure of our facts as we go along. I chose *V. Blattaria* for the female parent. As soon as the flowers opened the anthers were immediately cut off and the pollen of *V. Thapsus* was applied. Some flowers emasculated had no pollen applied to their stigmas. These seeded as well as did those to which pollen was applied. I was therefore fearful of some interference by bees, and, not wishing to pin my faith on two or three years of watching, the seeds were not sown. Next year all the flowers on the spike that were not needed were cut off, so as not to tempt the bees; but still the ones to which I applied no pollen fruited as well as the others did. These seeds were again not sown. I was led to suspect that the flowers were fertilized in the bud, and that, notwithstanding the reputation the plant had

for "spontaneous hybridizing," it was rather a case of in-and-in breeding. The next year I cut the flowers open with a sharp penknife before their natural time, and applied pollen to some and not to others. The last did not seed, the former did—pollen being applied twice at an interval of two days. I was now sure that I had a fair cross. Unfortunately, before ripe, though in an unfrequented spot which I thought safe enough, something broke off the stalk, and that ended the year's experiment. The next year I went to work again. This time I called the attention of my workmen to the plant as one that I wanted saved, and so felt safe. But, sure enough, one day I went over where the unlucky scythesman had been, and my flower stalk was cut down! This time it occured to me that if the stalk were planted deep in the ground it would still mature seeds; and it did, though not a large number. These were sown, and a few came up last year. To my intense annoyance, these plants were in some way destroyed. Feeling, however, that all the seeds could not have come up, and that some even from the same brood will remain two years in the ground, I let the spot remain undisturbed, and this spring I had six plants come up, which have grown nicely all summer. Unless some accident occur to them, they will flower next year. It is because of my unlucky experience that I want to place on record the results so far as they have gone, lest some woeful experience again cut off the story before it is completed. Well, the *V. Blattaria* has, in the young state, dark green, smooth and shining leaves, and they are deeply sinuately lobed. The leaves of my plants are quite unlike these, nor are they quite entire, thick and wooly like those of the common mullein, but they are precisely like those of the wild plants of the same age and size of *V. Lychnitis*. I pray, as only a botanist can pray, that my pets may be preserved till they flower, so that I may positively settle the question of the origin of *V. Lychnitis*. In the meantime, the following facts seem beyond dispute:

Verbascum Lychnitis in this part of the world has no particular tendency to spontaneous hybridizing with other species. It seems to be a self-fertilizer. It is, we may say, in great probability, a product originally of *V. Thapsus* and *V. Blattaria*. We have only to leave absolute certainty of this last proposition to the next season.

THOMAS MEEHAN.

The "Indian Peach."—John Lawson, who was in this country between 1700 and 1708, says in his New Voyage to Carolina (London, 1709), a propos of the peach: "I want to be satisfy'd about one sort of this Fruit, which the Indians claim as their own, and affirm they had it growing amongst them before any Europeans came to *America*. The Fruit I will describe as exactly as I can. The tree grows very large, most commonly as big as a handsome Apple-tree; the Flowers are of a reddish murrey Colour; the Fruit is rather more downy than the yellow Peach, and commonly very large and soft, being very full of Juice. They part very freely from the Stone, and the Stone is much thicker than all the other Peach Stones we have, which seems to me that it is a Spontaneous Fruit of *America;* yet in those Parts of *America* that we inhabit, I never could hear that any

Peach-Trees were ever found growing in the Woods; neither have the foreign Indians that live remote from the English any other sort. And those living amongst us have a hundred of this sort for one of the other; they are a hardy Fruit, and are seldom damaged by the North-East Blasts, as others are. Of this sort we make Vinegar; wherefore we call them Vinegar-Peaches, and sometimes *Indian* Peaches."

The peach was introduced into North America both by way of Mexico and the Atlantic seaboard. Its introduction into Mexico occurred at a very early period, for in Molina's Mexican Dictionary, published in 1571, fifty years after the conquest, we find three names for it, all hybrid, Hispano-Aztec compounds: *xuchipaldurazno*, 'orange-colored peach,' *cuzticdurazno*, 'yellow-peach,' and *xocotlmelocoton*, 'peach fruit.' From Mexico, the peach appears to have gradually worked its way northward through Texas to Louisiana, where, according to LePage DuPratz, it was found in cultivation among the Indians when the French settled that province (about 1698), and where it was seen by P. Montigny in cultivation among the Taensas in 1699. In an alleged Taensa vocabulary which was published at Paris two or three years ago, and which contains a curious assortment of names of tropical, sub-tropical, temperate and arctic plants and animals known to these Louisiana Indians, the name of the peach is given as *yŏsblŭ-ĭtwĕ*, 'marriage-fruit.' From the gulf region the peach appears to have reached Carolina at a date, according to Lawson's Indians, previous to the settlement of Europeans in that province, where it was known to the Tuscaroras as *ru-ue*, and to the Waccons as *yannĕ*.

This antiquity of culture of some variety of the peach among the Southern Indians probably accounts for a curious fact to which it is more particularly the object of this note to call attention, and that is that among several of the prominent tribes which formerly inhabited what are now the Southern States there is a distinct name for this foreign fruit, whence are derived not only the names of other introduced fruits, but also those of our *native* ones. For example:

CHOCTAW (Choctaw-Muscogee):
Prunus Persica, *takon* (a radical word.)
P. Americana, *takon lŭsh*, or *takon ŭshi*, 'little peach.'
P. Chicasa, *isi i*ⁿ *takonlush*, the 'deer's little peach.'
Pyrus coronaria, *isi i*ⁿ *takon*, the 'deer's peach.'
P. Malus, *takon tchito*, 'big peach.'
P. communis, *takon tchito holba*, 'similar to the apple' literally, 'peach big like.')

MUSCOGEE (Choctaw-Muscogee):
Prunus Persica, *pûkánû* (a radical word.)
P. Americana, *pûkánû'ho* 'barren peach.'*
P. Chicasa, *itcho im pûkánû*, the 'deer's peach.'
P. pumila, *pûkán tchi*, 'little peach.'

* So called, says Mrs. A. E. W. Robertson, who kindly gave me these Muscogee names, because the tree does not bear so regularly as do two other species of plums common in the Indian Territory, where these Indians are now settled.

SHETIMASHA:
Prunus Persica, *wépt* (radical.)
P. Americana, *wépt-nákht-sĕbu*, 'little peach.'

CHEROKEE (Huron-Iroquois?):
Prunus Persica, *kwanu*ⁿ (radical.)
P. Americana, *kwanunasti*, 'little peach.'
Has the "Indian peach" described by Lawson been perpetuated?
W. R. G.

On the General Exuberance of Pollen.—It seems to me, as I read, that a want of power to make legitimate deductions from facts is a common weakness with otherwise intelligent observers, and this occurs to me particularly when the subject happens to have relation to the cross-fertilization of flowers. Before me is a paper contributed to that excellent serial, the London *Gardeners' Chronicle*, on the "cross-breeding of cereals," in which the author lays great stress on the fact that this class of plants—one may say the whole order of Gramineæ consists of self-fertilizers. He points out how the pollen begins to shed, and the stigmas are in receptive condition before the florets expand, and that the objects for which anthers are formed "are fully accomplished before the stamens make their appearance outside the ear." But after this the anthers give out to the atmosphere an enormous amount of waste pollen, as any one walking through a grain field at that particular period has reason to know by his well smudged clothing. It has been found that an anther of wheat contains 6,864 grains, and that it takes 390,000 of them to weight but one grain. Rye pollen is heavier than that of wheat, or is yielded in larger quantity, for he gives 2 cwt. as the product per acre, while 50 lbs. is the pollen-product of an acre of wheat. He then emphasizes the fact that wheat, barley and oats are fertilized before the anthers are visible outside. After a while the reason for the usual abundance of pollen is sought for, and our author concludes "that the clouds of pollen in excess of customary requirements are but the exuberant provision by which nature has rendered the assurance of reproduction doubly secure." Exuberant is a good word, but "doubling" when the figures are 6,864 to the 1 required, is certainly placing the lion's share of the two halves of the double on the side of "exuberance." But what one who is accustomed to look for logical sequence can see in "assurance of reproduction" by giving pollen to the winds in the case of plants that self-fertilize—fertilize before the florets expand—is inexplicable. I think it must be admitted that not even with exuberance before us can this cloud of pollen have relation to any service to the plant, individually or collectively. I would submit that the reasons given in my Montreal address are more logical, *i. e.*, that plants are made to contribute to the general good, just as we are.
THOMAS MEEHAN.

Notelets.—Mr. George Taft of Uxbridge, Mass., has called my attention to a peculiarity in the leaves of an American elm which stands before his house. The tree is a large and very old one. The

leaves, in the proportion of about one in eight hundred, form a cup by a folding together and union of the basal edges, thus obliterating the usual sinus. No other elm in the vicinity presents this phenomenon.

I have seen within a few days, in Phenix, R. I., a fine plant of *Lilium superbum* with this peculiarity: all the flowers, and there were many, instead of the normal coloration, exhibited a clear yellow, without spots of any kind. I hope to secure bulbs, when I shall attempt to perpetuate this elegant sport.

W. WHITMAN BAILEY.

The Long Island Station for Magnolia glauca.—Near the end of last June, Mr. E. S. Miller, of Wading River, and I went in search of the locality at which the *Magnolia glauca* had been detected. There was no difficulty whatever in finding the place, as it is clearly described in Mr. W. H. Rudkin's note in the BULLETIN for August, 1883, (p. 95.) "Tuttle's Pond," a long, narrow mill-pond, formed by damming a brook, has, at its northern end, a swamp of several acres, through which passes the Long Island Railroad, which has here a culvert through which the brook enters the swamp. This is about two miles east of Speonk Station.

There were a few red maples and swamp laurels (*Kalmia angustifolia*), and scattered amongst these, in large numbers, were the magnolias, many of them from 15 to 20 feet in height and of remarkably vigorous growth. We were a few days too early to find the flowers fully out, and had to content ourselves with buds only.

G. M. WILBER.

Crantzia lineata.—I found this summer, in our salt meadows, *Crantzia lineata*, Nutt., which Mr. Peck (the State Botanist) says he considers a very rare plant in New York.

Wading River. E. S. MILLER.

Botanical Notes.

Production of Male and Female Plants.—Dr. H. Hoffmann (*Bot. Zeitung*, xliii., pp. 145–153, 161–169) has attempted to determine the conditions under which male or female individuals are produced in the case of the following diœcious plants: *Lychnis diurna* and *vespertina*, *Valeriana dioica*, *Mercurialis annua*, *Rumex Acetosella*, *Spinacia oleracea* and *Cannabis sativa*. He finds that in most, if not in all, of these cases, dense sowing increases the proportion of male plants produced, and this results from an insufficient supply of nutriment. As a general law, the production of male plants is promoted by the want of an adequate supply of food when in an embryonal condition. —*Jour. Roy. Microscop. Soc.*

Classification of Fungi.—In Cohn's Kryptogamen-Flora von Schlesien, Dr. J. Schröter proposes the division of the Fungi into the three following groups: I. Myxomycetes; II. Schizomycetes (parallel with the Phycochromaceæ; and III. Euomycetes, distinguished by their spores being formed by a sexual act.

The Euomycetes are again divided into seven families, viz.:

(1) Chytridiei; (2) Zygomycetes; (3) Oomycetes (related to the Siphoneæ); (4) Ascomycetes; (5) Uredinei; (6) Auriculariei; and (7) Basidiomycetes.

The Basidiomycetes are divided into (1) Tremellinei; (2) Dacromycetes; and (3) Eubasidiomycetes, which again are made up of (*a*) Hymenomycetes, (*b*) Phalloidei, and (*c*) Gasteromycetes.—*Jour. Roy. Microscop. Soc.*

Development of the Apothecia of Lichens.—Dr. M. Fünfstück has followed the development of the apothecia in three genera, *Peltigera*, *Peltidea* and *Nephroma*. In *Peltigera canina* an interval of several years passes between the first formation of an apothecium and the production of the first ripe spores. In *Peltigera* and *Peltidea* there are no spermogonia.

In *Peltigera malacea* the apothecia originate as extremely minute roundish dots on the margin of the thallus, where a few filaments, irregularly coiled into rosettes, the ascogonia, are formed close beneath the cortical layer, on a level with the gonidial zone; they are simply portions of the ordinary hyphæ, which increase in length by apical growth, while the ascogonial cells increase at the same time in size by intercalary growth. The cortical fibres and the ascogonial tissue are strongly differentiated from the first. The next period of development begins with the formation of the first paraphyses, commencing in the cortical layer of the apothecium. A mass of young cortical fibres in the middle of this layer displays delicate shoots, which develop into the paraphyses. These gradually extend over the entire cortical layer of the apothecium, new ones being formed between the older. At the same time, the separate ascogonial cells shoot out and form the ascogenous hyphal tissue. The process of disorganization of the ascogonia runs parallel with the formation of this tissue, and finally the asci are formed as bulgings of the ascogenous hyphæ; the outer part of the cortical layer bursts, and thus is formed the "excipulum thallodes" of lichenologists. The formation of the apothecium is not the result of any sexual process, the strong differentiation of the ascogenous hyphæ from those which develop into paraphyses being traced back to the youngest stage. The author regards the process as the same as that in *Podosphæra* among Ascomycetes, apogamy with rudimentary sexual organs.

The processes are nearly the same in *Peltidea aphthosa* and *venosa*, while in *Nephroma tomentosum* and *lævigatum* there are important deviations. In these species the author always found spermogonia, though always in a rudimentary condition. The first apothecial layer is formed beneath a thick, close, cortical layer in the margin of the thallus by a number of large, thin-walled cells arranged in a moniliform manner, and from the analogy of *Peltigera* and *Peltidea*, regarded as ascogonia, developed gradually from ordinary hyphæ of the thallus. The entire structure is enveloped in a dense hyphal tissue, which gradually disappears as the fructification develops; and the apothecia of *Nephroma* are hence described as gymnocarpous. The formation of the ascogonia was not clearly observed. The mode of formation of the paraphyses is similar to that in *Peltigera*,

but takes place later. The paraphyses and asci are always formed on the under side of the thallus, so that the young apothecia at first face the substratum ; their position is subsequently reversed by a strong curving of the fertile layer. We have therefore in these lichens phenomena of apogamy, similar to those that have been observed in the Ascomycetes.—*Jour. Roy. Microscop. Soc.*

The Coloring Matter of Flowers and Fruits.—In an interesting communication on the subject of coloring matters in flowers and fruits, contributed to a society at Wurzburg (*Gard. Chron.*, June 20th, p. 794), Dr. A. Hansen gives reasons for supposing that a relatively small number of pigments suffices for the production of the apparently endless variety of tints. Taking flowers in the first instance, and setting aside chlorophyll green as being rarely met with in them, he recognizes three groups of colors, the yellows, the reds, and the blues and violets. White is due merely to the reflection of light through colorless tissues containing air, and blacks are attributed to a concentration of violet pigments. The yellow pigments are mostly in combination with plasmatic substances, whilst the reds and blues and violets are generally found in the cell-sap. The yellow of flowers is said to form an inslouble compound with fatty matters, which it is thought might explain the comparative permanence of that color in plants. The pigments of different yellow flowers have been found to agree with each other so closely in respect to their spectra as to point to identity, and Dr. Hansen obtained by saponification with soda, and extraction with light petroleum spirit, a crystalline yellow pigment which corresponded in its behavior to the "lipochrome" obtained by Krukenberg from the animal kingdom. Orange is due to a denser deposit of the yellow pigment, the color in orange rind being referrible to the same substance as that in the petals of *Ranunculus repens*. The pigment in yellow dahlias and lemon rind, however, behaves differently, both chemically and spectroscopically; it is soluble in water and seems to be very similar to the pigment of *Æthalium septicum*, the yellow fungus or mould of rotten wood. The reds of flowers Dr. Hansen reduces to a single pigment; the description of which, so far as it goes, appears to correspond to that given some years since by Mr. Harold Senier of a coloring matter isolated by him from the petals of *Rosa Gallica*. The varying intensity of the colors of roses, carnations and pæonies, it is thought might be due to the presence of acids, which, according to Mr. Senier, would deepen the shade of the red coloring matter, whilst the scarlets and brick-reds of poppies, scarlet lilies, and dog-rose hips are attributed to the modifying influence of some yellow pigment (lipochrome) present. The blue and violet pigments, Dr. Hansen looks upon as derivatives from the red, and in support of this view it is pointed out that certain flowers pass from red to blue or violet. It is also known that the pæony-red is changed to violet by salts of iron or sodium phosphate, whilst gardeners produce blue hydrangeas by adding iron to the soil. As to fruit and leaves, the change of color which takes place in the autumn is accounted for by the decomposition of chlorophyll, with the formation of new pigments, or the unmasking of yellow (lipochrome) previously dominated by the

chlorophyll. Dr. Hansen therefore assumes that there are only four fundamental plant pigments—the two yellows and the red of flowers and chlorophyll green.

Rhubarb Culture in the United States.—Mr. J. W. Colcord, of Lynn, Massachusetts, who, during the last few years has been turning his attention to the acclimatization of medicinal plants in the United States, has been further experimenting as to the value of the leaf stalks of the home-grown *Rheum palmatum* as an esculent. He reports that plants raised from seed sown last May have now leaves two feet in length, with petioles an inch in diameter; and that these have been found to be equal in tenderness and flavor to the best pie rhubarb in the market. As there are indications that the therapeutic value of the home-grown root will also be established, Mr. Colcord looks forward to the utilization of the plant (which proves to be hardy) in both directions.

Two new Terms have recently been added to the already overburdened terminology of botany. Dr. F. Krasan has noticed that where the leaves of the oak are attacked by the *Orchestes Quercus*, the deposit of the eggs of the insect arrests the growth of the leaves attacked, which become thicker and more rigid than the ordinary leaves, and that in June these are followed by a second growth of leaves of very large size, and later by a growth of normal leaves. To these phenomena he gives the name of "pachyphyllosis" and "megalophyllosis." The distortions produced may, he believes, in some cases become hereditary and cause the appearance of apparently new species, as in the case of *Quercus brachyphylla*, Kotschy, probably derived from *Q. pubescens*. Similar changes occur in *Abies* and *Thymus serpyllum*.

Peptonizing Ferment of Ficus.—Dr. A. Hansen, having examined the latex of the common fig, *Ficus carica*, confirms the statements of previous observers concerning the presence of a peptonizing ferment in it. In its effect on fibrin and the coagulation of milk this ferment resembles pepsine. It also produces the diastasic reaction of the conversion of starch into sugar, and a syrup made from dried figs has the same peptonizing property as the latex. It is remarkable that no similar effect could be obtained from the milky juice of Euphorbiaceæ or of *Papaver somniferum*, *Chelidonium*, *Taraxacum* or *Scorzonera*, although the fluid secretion in the pitchers of *Nepenthes* possessed peptonizing properties similar to those of the latex of the fig tree.

The Qualities of Redwood (*Sequoia sempervirens*) are peculiar. Though light, soft, weak to resist a transvere strain, brittle, and easy to split, it excels oak in its power of resistance to the decomposing influences of the air and the soil. It is a little over a quarter of a century since the manufacture of redwood timber commenced, but the consumption is now enormous. In California it is preferred to any other lumber for all parts of the exterior of buildings, and is largely used also in the interiors. The roofs of almost all buildings in California, both in city and country, are covered with redwood shingles, while ruder erections are roofed with large rough shingles known as "shakes" throughout the State. It is the almost exclusive material

for fence-posts, rails, telegraph poles, railway-ties, wine-casks, tanning and water-tanks, coffins and every purpose where durability is a greater requisite than strength. A novice in the country districts of California wonders why farmers wear gloves when moving a fence, but after a few of the sharp, needle-like splinters of the split rails have entered his hand and festered there, he wears gloves himself. Redwood shingles are coming into favor in the more eastern States which now use a large quantity of redwood timber.

The softness of the wood is the only objection that can be urged against its use in interior decorations. It is of a beautiful, clear light red color, and is susceptible of a good polish, but the ordinary varieties are so soft that the nail, even the knuckle, will make a dent. Yet, as it shrinks and swells less than any other wood, and neither checks nor warps, it is better fitted even for internal finish than many woods which are more used in the Atlantic States. The objection of softness does not apply to the knots or gnarls which grow on some tree trunks, and sometimes attain a diameter of eight or ten feet. These knots are full of tiny bird-eyes, are very hard, and, like bird's eye maple, are well adapted for ornamental cabinet-work, whether used solid or as veneer. Another ornamental variety much esteemed in California is the "curly" redwood, in which the grain is wavy throughout.

The best part of the redwood tree is the butt, the very part which it is, or rather was, the custom to leave in the ground to a height of several feet. Dark red, comparatively hard, heavy and close grained, these butts are indestructible by weather or by fire.

Redwood is a very poor fuel, for it contains little or no pitch. When dry and cut small it takes fire very easily, so much so that it makes good kindling, but a stoveful burns away in little time with little production of heat.

The wood of this *Sequoia* is much heavier than the wood of the *Sequoia gigantea* or big tree, the bark, usually deep-seamed, is often 12 to 18 inches thick: the cones or fruits are not more than an inch or an inch and a quarter, and the leaves small, flat, sharp-pointed, green above, and arranged in a row on each side of the twig which bears them.—*Southern Lumberman.*

Fossil Flora of the Rocky Mountain Region of Canada.—Dr. G. M. Dawson, in the *Transactions* of the Royal Society of Canada, describes a remarkable Jurasso Cretaceous flora recently discovered by him in the Rocky Mountain regions of Canada, and also the intermediate groups of plants between this and the Middle Cretaceous. The oldest of these floras is found in beds which it is proposed to call the Kootanie group, from a tribe of Indians of the name which hunted over that part of the Rocky Mountains between the 49th and 52d parallels. Plants of this age have been found in the branches of the Old Man River, on the Martin Creek, at Coal Creek, and at one locality far to the northwest on the Suskwa River. The containing rocks are sandstones, shales and conglomerates, with seams of coal, in some places anthracitic. The plants found are conifers, cycads and ferns, the cycads being especially abundant and belonging to the genera *Dioonites*, *Zamites*, *Podozamites* and *Anomozamites*. Some of

these cycadaceous plants, as well as some of the conifers, are identical with species described by Heer from the Jurassic of Siberia, while others occur in the Lower Cretaceous of Greenland. The almost world-wide *Podozamites lanceolatus* is very characteristic, and there are leaves of *Salisburia Sibirica*, a Siberian Mesozoic species, and branches of *Sequoia Smittiana*, a species characteristic of the Lower Cretaceous of Greenland. No dicotyledonous leaves have been found in these beds, whose plants connect in a remarkable way the extinct floras of Asia and America and those of the Jurassic and Cretaceous periods.

Merulius lacrimans—the Dry Rot.—A short time before his death, Prof. H. R. Goppert, of Breslau, in connection with the chemist, Professor Poleck, made a study of the *hausschwamm*—a fungus commonly known with us as dry rot, which had caused great injury to buildings in Northern Germany. The results of their combined studies now appear in a pamphlet by Professor Poleck (Der Hausschwamm, Breslau, 1885). The dry rot, *Merulius lacrimans*, seems to be unknown in a wild state in Germany, but is confined to woodwork of different kinds, and attacks by preference coniferous timber. Strange to say, the fungus does not usually infest old structures, but generally makes its appearance in comparatively new buildings; and a startling series of figures shows the amount of damage done in the region of Breslau. Chemical analyses by Poleck show that the *Merulius* is particularly rich in nitrogenous compounds and fat, which is rather remarkable when one considers the chemical constituents of the timber on which it grows. Injury to health, or even death, is said to result from exposure to air containing large quantities of the spores of the fungus; and several authenticated cases are reported. In a supplementary note, Poleck considers the relationship of *Merulius* to *Actinomyces*, a fungus which causes a characteristic disease in man and cattle; and he apparently comes to the conclusion that what is called *Actinomyces* is probably only the *Merulius* altered by the peculiar matrix on which it is growing. His statements on this point can hardly be called conclusive, or, in fact other than vague.

Botanical Literature.

A Revision of the North American Species of the Genus Scleria. By N. L. Britton, Ph.D. 8vo, pamph. pp. 8. (From the *Annals* of the New York Academy of Sciences, iii., 7.)

Criticisms on J. Kruttschnitt's Papers and Preparations relating to Pollen-tubes. By N. L. Britton. 8vo, pamph., pp. 10. (From the *Journal* of the New York Microscopical Society.)

The Grape-Rot. By Wm. Trelease. 8vo, pamph., pp., 9. (From *Transactions* of Wisconsin State Horticultural Society.)

Hypericum Japonicum, Thunb., *in Deutschland gefunden.* Von R. v. Uechtritz und P. Ascherson. 8vo, pamph., pp. 10. (From *Berichte* der Deutschen Botanischen Gesellschaft.)

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Further Notes upon Corema.

By JOHN H. REDFIELD.

My notes (in BULLETIN for September 1884) upon the localities of *Corema Conradii* have had the desired effect of eliciting from other contributors many new facts in regard to its distribution, especially in the more eastern portions of its geographical area. Among the more interesting of these notices is that of Mrs. Owen announcing its occurrence in the open sandy plains of Nantucket, where the conditions are such as would lead us to expect it, and also that of Prof. Lawson relative to the varied conditions under which it appears in Nova Scotia. He has pointed out the fact that, when growing in sand or gravel, the plant becomes more gregarious, covering continuously large areas, while upon rocks it is restricted to more isolated patches. Its manner of growth, in all the localities I have seen, accords with the observations of Prof. Lawson.

Early in July of this year, after some ineffectual search in Martha's Vineyard, I had an opportunity to see one or two of the localities in Nantucket. My examination was necessarily hasty, and probably I did not strike the most abundant one mentioned by Mrs. Owen. But I saw very numerous and extensive areas of the *Corema* between the old and new roads to Siaconsett, about four miles out. Its associates were *Arctostaphylos Uva-ursi* (which grows upon this island in greater profusion than I have seen it elsewhere), *Hudsonia ericoides*, and *Comptonia*, with some *Myrica cerifera* in the vicinity. The soil appeared to be purely silicious.

Through Mrs. Haines of Bangor, I have received a specimen of *Corema* collected this summer by Mr. Robert Smith of Jersey City, at North Truro, Cape Cod, where it was associated with *Hudsonia ericoides*, "on the side of a hill near the foot of which was a growth of scrub-pine." This may be the locality mentioned to me by Mr. Benjamin M. Watson, Jr. (BULLETIN xi., 99.)

In August, I climbed Mt. Beatty and Mt. Megunticook, which lie just north of Camden, Me., and which I suppose are the eminences referred to by Prof. Chickering (BULLETIN xi., 116.) I was not successful in finding his locality. The summit rocks there are of quartzite, much glaciated, and would afford a suitable silicious soil. Much *Pinus Strobus* grows upon these hills, but I saw no *Pinus rigida*, the usual tree concomitant of *Corema*. There may perhaps be some error in Prof. Chickering's reference to this locality. Blue Mountain which he names lies not back of Camden, but about 22 miles northeastward, beyond Castine.

Nor did I succeed in finding this plant upon Green Mountain in Mt. Desert Island, though a large part of the bare ledges of its summit and of its western flanks was searched on the 7th of August of this year. Yet in so large an area it might easily elude discovery, and, even if now absent, it may once have existed previously to the fires which have so repeatedly overrun this mountain, and which have evidently made great changes in the character of the vegetation. On the rocks just east of the observatory I noticed limited quantities of *Hudsonia ericoides*, which may possibly have been mistaken for *Corema*. Nor did I observe *Empetrum* on that mountain, though so abundant on the headlands near the shore.

I can, however, announce the discovery of *Corema* in the southern part of Mt. Desert Island, near Seal Harbor, in three distinct localities. These are all upon the ridge called Jordan's Hills on the Coast Survey Chart, and on that portion of it which has been named Barr's Hill. My attention was called to the first of these localities by Mr. Arthur Chase of Haverhill, Mass. It is upon the western brow of the hill, upon a broad rock terrace overlooking Long Pond, about 150 feet above the level of the pond. Within a space of 50 feet square occur eight or ten patches of *Corema*, in scanty soil upon almost bare rock, disputing possession with *Gaylussacia resinosa* and *Vaccinium Pennsylvanicum*. Its other neighbors were *Potentilla tridentata*, *Kalmia angustifolia* and *Viburnum nudum*. The nearest trees were 40 or 50 feet distant, and were mainly *Populus alba*, var. *populifolia*, and *Pinus Strobus*. The rock is a sienite containing quartz and felspar in about equal proportions, with a very small admixture of hornblende, and the comminuted fragments make a sand of similar composition. A few days later, a second locality was found by Rev. Archibald M. Morrison of Orange, N. J. This is upon the eastern side of the ridge, a little northward from the head of the old path from the Seaside House, and nearly 300 feet above tide. Here there is but a single patch of the plant, six or eight feet in diameter, and here too it seems likely to be eventually stifled by a growth similar to that already mentioned. The rock is the same, with deeper soil. On the 19th of September, I found a third locality upon the southwest brow of the ridge, northeast from the "sea-wall" of Long Pond, 100 or 120 feet above tide. Here four or five patches are found under surroundings much like those of the other localities. The underlying rock is the same. The indications of dying out are more apparent here, there being a large amount of the dead plant on the margins of the patches, and one large patch of several feet in diameter was entirely dead, except for a few inches in the centre. We may note that, in all these localities upon Barr's Hill, the soil is less exclusively silicious than in any previously seen, and that the prevalent pine is not *Pinus rigidus*, but *Pinus Strobus*. This hill contains hundreds of acres of bare, horizontal ledges of rock just as well adapted to the growth of *Corema* as is the limited space actually occupied by it, and yet repeated and careful examination of its surface by numerous observers have brought to light not enough of it to cover a tenth of an acre.

The study of the various localities of *Corema* which I have been

able to see convinces me that the plant had a very early introduction to our flora, perhaps following the glacial period, and that under less favoring circumstances it is becoming more and more restricted, and must eventually be supplanted by more vigorous competitors for existence.

The Botany of the Aztecs.—The various aspects of a scientific subject become in these days remarkably illustrated. We have seen an example of archæological botany in the light thrown upon the ancient flora of Egypt by the discussions of the evidence afforded by a few withered wreaths disentombed with the mummy of a Pharaoh. Recently, a Spanish writer has occupied the pages of the Anales del Museo Nacional de Mexico with an elaborate examination of the botanical lore of the ancient Aztecs and other dwellers in Mexico at the time of the conquest. A brief resumé of his conclusions may prove of interest in the pages of the BULLETIN, as the Anales are not widely distributed, and are not generally supposed to contain matter of value to botanists.

It seems conceded that the inhabitants of pre-Columbian Mexico had made very considerable progress in botanical study; they had, according to our author, formed an artificial classification, an extended glossology, and a system of iconographic representations by which they indicated plants by conventional symbols. At the time of the conquest, botanical science in Europe had itself made little progress beyond the limited developement that it had amongst the Greeks; the classification was largely medical, and trees and herbs constituted the two great divisions of the vegetable kingdom. At this time, in Mexico, the Aztecs and related tribes had established botanical gardens in which were grown plants that had been collected from the various districts of the kingdom, from newly acquired territories and from neighboring states or tribes. Thus, the handsome Bombaceæ known as *Cheirostemon*,* which was early found flourishing outside of the usual limit of its distribution, was regarded by Baron Humboldt as a plant transplanted by the ancient Matlatzincas.

The author of this treatise has used the famous work on the natural history of Mexico by Hernandez in its re-edited form, supplementing it with the testimony of other authors, and personal search amongst Indian vocabularies. The synonomy of the Mexicans, he claims, was extended, indicating our distinction between a scientific and a common name; thus, the plant called *totoycxitl*, 'bird's-foot,' in allusion to its quinquelobate leaves, was also called *caxtlatlapan*, which classed it with a botanical group—that of the Convolvulaceæ, it being an *Ipomœa*.

Quite frequently the various names of a plant arose from the form or other characteristic of some portion of it, or from its uses; thus, *chapulxochitl*, meaning 'locust-flower,' because of a resemblance of the flower to that insect, was also called *tenapalitl*,† also *mincapatli*, 'arrow-

*Called by the Aztecs *macpalxochitl*, 'hand-flower,' from the peculiar shape and arrangement of the stamens.—ED.

† A name for several plants resembling *Sedum*, or life-everlasting.—ED.

medicine,' because it was employed to heal wounds; and also *comalpatli*, 'spleen-medicine,' in reference to a medical use. A regional name of *pinipiniche* was also used for this same plant. Other instances are explained where a classificatory name, and one indicating the use or properties of the plant existed. Hernandez has recorded 3,000 names of plants, of which 250 are in the Tarascan language. The remainder are Mexican, and, as a great many of these were originally found in the Mexican domain proper, where the Nahuatl language prevailed, the author concludes that the Mexicans in their marauding expeditions had observed and named them, and had also studied them in the gardens which they maintained for alien plants on the central plateau. Our author says that they availed themselves of comparisons between exotics and their indigenous plants, and "then, taking a plant with a known name as a type, and using the same name with a qualifying and expressive termination, applied it to another that was analogous or similar."

In glossology the Nahuans had reached a very considerable elaboration of descriptive and classificatory terms. Thus, in general, their terminology for plant-forms included the following: *quauhuitl*, 'tree,' *xihuitl*,* 'herb,' and *quaquauhtzin*, 'shrub.' *Copalquauhuitl*, the 'copal-tree,' was a tree-like terebinth; *copalxihuitl*, 'copal-herb,' was an herbaceous labiate; *micaquauhuitl*, the 'corpse-tree,' was an arborescent Convolvulad; and *micaxihuitl*, 'herb of the dead,' a *Lobelia*.† *Tic* was used as a suffix signifying the 'form of,' like the Greek $\epsilon\iota\delta o\varsigma$; as *chichiantic*, 'like chian;' and this particle was constantly used in plant-names to indicate affinity or resemblance. The nature of the medium in which the plant grew was also considered in its nomenclature; thus *atl*, 'water,' was represented by the prefix *a* before the rest of the plant's name. If the stem of the plant was serpentine and flexible, a special term was employed, while the prostrate and recumbent positions were expressly recognized. The writer cites many examples of the application of these terms, and enters into an analysis of the expressive Mexican names for plants, one of which is in part a specific description, viz.: *tepehoilacapitzxochitl*, or, translated, an ornamental plant which grows in mountainous places, tall, and knotty, and slim.‡ The author continues in an interesting enumeration of the Indian terms for other characters of the stem, as its surface, length, thickness, coloration, composition, form, and durability,all displaying a surprising minuteness of descriptive terminology.

The Mexicans used four names for leaves: *maitl*, *atlapalli*, *amatlapalli* and *izhuatl*. The first of these terms arose from an interesting

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* *Xihuitl* is a generic term for herb, and *quilitl* for an edible one. To the above terminology should be added the words so frequently found in Aztec plant-names: *xochitl*, 'flower,' *xocotl*, sour 'fruit,' and *tzapotl*, sweet 'fruit' (whence Sp. *sapote*, and the name of the order Sapotaceæ.)—Ed.

† *Lobelia acuminata;* called also *micaxochitl*, 'flower of the dead,' from its use in restoring epileptics to consciousness.—Ed.

‡ This interpretation by the Spanish writer is very erroneous. The word means, literally, 'mountain flute-flower.'—Ed.

generalization. It (*maitl*) means 'branch,'* and was frequently used in this sense. It was applied to old and young limbs, and it expressed the idea in the minds of these people that the tree was a group of branches of which the leaves were the last and most tenuous form. *Atlapalli* means both a 'leaf' and a 'bird's wing,' another interesting simile; *amatlapalli*, our author seems to think implies something thin, resembling paper (*amatl*); *izhuatl*, the last term, probably signified the frond of a palm.

The paper contains a long discussion of the involved and difficult subject of the Mexican graphic representation of plants. The Indians, for this purpose, employed three methods, the figurative, the symbolic, and the syllabic, either alone or combined. The figurative was generally used when the component parts of a plant were to be indicated, as branches, leaves, flower, fruit and seed; but the entire plant was indicated by combining the two methods of symbolism and syllabism. The conventional sign for a tree was a branching base, colored red, representing the root, from which sprang the trunk, almost always cylindrical, which was subdivided into three branches, usually gray in color, while from the extremity of each branch started a green object formed of obtuse segments representing leaves. This was the universal arborescent type, which was variously modified in separate cases. Our author asserts the use by the Indians of a sign of generic value. Thus, plants known under the general class of *zacatl* † had a special symbol which consisted of two parts, a central axis, with a series of parallel yellow lines disposed symetrically from one to the other side of the axis.

It is insisted that the Indians of Mexico possessed very considerable skill in drawing, judging from the symmetry, and the quality of execution of these hieroglyphics.

The botanic symbol, as used for a group of plants resembling each other in some particular, gave rise to classification and nomenclature, and the discussion of this forms the last portion of the author's instalment of his studies, which are yet unfinished.

Conoidal fructification formed the generic symbol of the pines, the pod that of the Leguminosæ, the tuberous root for certain Convolvulaceæ, a leaf with lateral spines for various Cactaceæ. These generic signs, modified by special ones, lent themselves as a flexible instrument for the indication of subordinate groups, as the lanceolate leaf joined to a tuber indicated a variety of the edible camote [sweet potato] the stone united with a spiny leaf a species of *Opuntia*.

Our author, through a number of pages, endeavors to show that the Indians had a nomenclature similar to that invented by Linnæus.‡

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* *Maitl* is the Aztec word for 'hand,' and it was the fingers spreading out from the palm that suggested the idea of branches. Hence the name *quilmaitl*, 'herb-hand,' for the branch of an herb, and *quamaitl*, 'tree-hand,' for the branch of a tree. We have met with no compound in which *maitl* signified 'leaf.'—Ed.

† A word generic for 'grass.'—Ed.

‡ We are inclined to think that the Spanish writer has a very vague idea of the Linnæan system. We have studied Hernandez's Thesaurus very carefully, as we have that rich repository of Aztec botany—Sahagun's work—but we have failed to observe any other sort of classification than that found in the popular nomenclature of plants in all languages.—Ed.

This nomenclature consisted in using a specially descriptive term and prefixing it to the general name of the plant, as we might say a red rose, a climbing hop-vine, a trailing honeysuckle, etc. In this manner the Indians collected a large body of identifying names for plants, and the inference seems warranted that to this extent they possessed a nomenclature which was directly related to a useful if not altogether natural system of classification, the whole based upon striking features or useful properties of the plants they described.

In the names of plants the most interesting modifications are instanced, by some of which plants inhabiting moist places were indicated, those flowering at certain times, plants growing on the margins of streams, those commencing to flower with the first waters of the wet season, and declining with its increase, were all variously characterized. The soil in which plants grew and their habitat were also denoted by prefixes. The various parts of a plant were carefully distinguished, as the root, the trunk, the branches, the leaves, the flower, the fruit. These terms were again modified by specific designations when the parts assumed peculiar shapes or possessed peculiar properties.

The features of the trunk and branches and the disposition of the latter, and the habit of the growing plant found mention in the terms and names employed by these pre-Columbian botanists.

The enthusiasm of the author may lead him to overestimate the actual progress made by the Aztecs in this science, but every one who reads his elaborate essay must feel a curious shock of surprise at finding that so much can be probably claimed for them.

L. P. GRATACAP.

Contributions towards a List of the State and Local Floras of the United States.

THE PACIFIC COAST. CALIFORNIA.

Descriptions of Plants collected by Mr. William Gamble in the Rocky Mountains of Upper California. By Thos. Nuttall. (D.)

In Proc. Phila. Acad. Sci., Vol. iv. 1848.

Botanical Report on Routes in California, to connect with the Routes near the 35th and 32nd Parallels, explored by Lieut. R. S. Williamson, in 1853. By E. Durand and S. C. Hilgard, M.D. (C.)

In Rep. on Exp. and Surveys from Miss. River to Pacific Ocean, Vol. v., Part iii., Washington 1856 (33d Congress, 2nd Sess., Ex. Doc. No. 91.)

Descriptions of Plants collected along the Route, by W. P. Blake, and at Mouth of the Gila, by John Torrey. (C.)

In Rep. on Exp. and Surveys from Miss. River to Pacific Ocean, Vol. v., part ii., 359–370.

Botanical Report on Routes in California and Oregon, explored by Lieut. R. S. Williamson, and Lieut. Henry L. Abbot, in 1855. By J. S. Newberry. (C.)

(Comprises: Chapter i., Geographical Botany; Chapter ii., Description of the Forest Trees of Northern California and Oregon.)

In Expl. and Surveys from Miss. River to Pacific Ocean, Vol. iv., part iii., pp. 1–64.

General Catalogue of the Plants collected on the Expedition. By J. S. Newberry, Asa Gray and John Torrey; the Mosses and Liverworts by W. S. Sullivant, and the Lichens by Edward Tuckerman. (B.)

In Expl. and Surveys from Miss. River to Pacific Ocean, Vol. iv., part iii., pp. 65–94.

Botanical Report on Routes in California to connect with the Routes near the 35th and 32nd Parallels, and Route near the 32nd Parallel, between the Rio Grande and Pimas Villages, explored by Lieutenant John G. Parke in 1854 and 1856. By John Torrey, M.D. (C.)

In Expl. and Surveys from Miss. River to Pacific Ocean, Vol. vii., part iii., chap. i.

Synoptical Tables of Botanical Localities in Dr. Torrey's Report. By Thomas Antisell, M.D. (B.)

In Expl. and Surveys from Miss. River to Pacific Ocean, Vol. vii., part iii., chap. ii.

Catalogue of Pacific Coast Mosses. By Leo Lesquereux.

In Proc. Calif. Acad. Sci., Vol. i. San Francisco.

Botany of the Geological Survey of California, Vol. i., by W. H. Brewer, Sereno Watson and Asa Gray; Vol. ii., by Sereno Watson. (D.)

2 Vols., 4to. Cambridge, 1876 and 1880.

Catalogue of the Pacific Coast Fungi. By W. H. Harkness, M.D., and J. P. Moore. (B.)

Pub. by Calif. Acad. Sci., 8vo, pamphl. pp. 46, San Franisco, 1880.

Forest Trees of California. By A. Kellogg, M.D. (D.)

In 2nd Rep. State Mineralogist, Cal., (1882) Appendix, p. 1–116.

Flora of Southern and Lower California. By C. R. Orcutt. (A.)

8vo, pamph., pp. 13. San Diego, 1885.

San Francisco County.

Catalogue of the Plants growing in the vicinity of San Francisco. By H. W. Bolander, 1870.

San Diego County.

Marine Algæ of San Diego, California. By Daniel Cleveland. (A.) 1885.

OREGON.

Enumeration of a Collection of Plants made Mr. Elihu Hall in Oregon in the Summer of 1871. By Asa Gray. (C.)

In Proc. Amer. Acad. Arts and Sci., 1872.

Notes on the arboreous, arborescent and suffruticose Flora of Oregon. By Elihu Hall. (C.)

In Botan. Gazette, Vol. ii., pp. 85-89, 93–95, 1877.

Catalogue of the Flora of Oregon, Washington and Idaho. By Thomas Howell. (A.)

18vo, pamphlet, pp. 23, Arthur, Oregon, 1881.

ALASKA.

Sketch of the Flora of Alaska. By J. T. Rothrock, M.D. (C.)

In Rept. Smithsonian Institution for 1867, Washington, 1868, pp. 433–463 (Anophytes by Thomas P. James, Lichenes by H. Mann, Algæ by W. H. Harvey).

A List of Plants collected by Mr. J. Albert Rudkin on a trip to Mt. St. Elias, in the Summer of 1883. By N. L. Britton. (C.)

In Bull. Torr. Bot. Club, Vol. xi., p. 36, 1884.

Catalogue of Plants collected in July, 1883 during an Excursion along the Pacific Coast in Southeastern Alaska. By Thomas Meehan. (C.)

In Proc. Acad. Nat. Sci., Phila., pp. 76–96, 1884.

List of Plants collected by Charles L. McKay at Nushagak, Alaska, in 1881, for the United States National Museum. By Frank H. Knowlton. (B.)

In Proceedings of United States National Museum, 1885, pp. 213–221.

W. R. G.
N. L. B.

Broome County (N. Y.) Finds.—As far as I can determine, this county has never been thoroughly worked. Dr. Torrey, in his Flora of the State of New York, says: "The parts of the State that have been least explored botanically are the counties which lie on the borders of Pennsylvania, etc." In view of this fact, I have this year commenced a systematic exploration, so far finding two of the species that the doctor thought would be found in the State in this district, viz.: *Negundo aceroides*, Mœnch., and *Rudbeckia fulgida*, Ait. I append a few notes on my work this season, which, though incomplete, will give some idea of the probabilities of this locality. The following species, which I have met in counties west and north of this, I have not yet found here:

Claytonia Virginica, L., *Pinguicula vulgaris*, L., *Vesicaria Shortii*, T. & G., *Salix purpurea*, L., *Polygala Senega*, L., *Baptisia tinctoria*, R. Br., *Dicentra Canadensis*, DC., *Coptis trifolia*, Salisb., *Hydrastis Canadensis*, L., *Geum rivale*, L., *Sanguinaria Canadensis*, L. (strange as it may seem), *Rhus aromatica*, Ait., *Gymnocladus Canadensis*, Lam., *Asclepias tuberosa*, L., *Campanula rotundifolia*, L., and *Arisæma Dracontium*, Schott.

These I mention as plants that really ought to be found—except, mayhap, the second to fourth—and may hereafter be located.

Datura Stramonium, L.—Many individuals were found near a negro settlement on State St., city.

Datura Tatula, L.—One individual only, that near a comb factory, where the horns are kept, probably imported with them.

Melilotus officinalis, Willd.—Plentiful, but in one situation only, the *M. alba*.

Lychnis vespertina, Sibth.—In two situations.

Cassia Marilandica, L.—One individual only, that on Noyes Island, near the city, in the Chenango River.

Cypripedium acaule, Ait.—One individual only, and that a beautiful specimen, was found growing upon the upper side of a prostrate mossy trunk of *Abies Canadensis*, a strange situation for the largest and most perfect specimen I ever saw.

Betula papyracea, Ait.—Five clumps were found on the north aspect of South Mountain.

Chamælirium luteum, Gray., is plentiful and very characteristic, both male and female, in a deep wood a mile north of Port Crane.

Monotropa Hypopitys, L.—Ross Park (a natural reservation.)

Negundo aceroides, Mœnch.—At Hawleyton, near the Pennsylvania State line. A beautiful specimen has also been transplanted in the Court House square, this city.

Rudbeckia fulgida, Ait.—In an old field west of the city cemetery.

Menyanthes trifoliata, L.—Cranberry swamps near Gulf Summit.

Epilobium palustre, L., var. *lineare*, Gray.—Same locality.

Viola Selkirkii, Ph.—Dickson's ravine, Port Dickinson.

Tussilago Farfara, L.—Though this plant is common in most parts of the State, I have met but one individual here; that in Ross Park.

Gillenia trifoliata, Mœnch.—Not uncommon.

Humulus Lupulus, L.—I have met the plant along the Susquehanna River, but can hardly call it indigenous in its localities.

Lysimachia nummularia, L.—This beautiful plant has escaped in great profusion to the grassy banks of Trout Brook, near the city. I have not, however, seen it in cultivation here.

Verbascum Blattaria, L.—One individual only, found in the cemetery.

Cardamine pratensis, L.—Plentiful on the borders of Pond Lake.

Berberis vulgaris, L.—One bush grows, I judge spontaneously, about a mile and a half from the city, in an open wood along Trout Brook.

Cichorium Intybus, L.—Escaped to some of the city streets.

Galeopsis Tetrahit, L., flourishes in Dry Brook near the city.

Asclepias quadrifolia, Jacq.—Common on the southern slopes of Prospect Hill.

Polygala paucifolia, Willd.—The pure white variety was very common at Pond Lake.

Impatiens fulva, Nutt., and *pallida*, Nutt.—Spotless forms were met on Noyes Island.

Aralia quinquefolia, Gray., though being rapidly dug up by "root-gatherers," is still quite plentiful in the woods near the Pennsylvania line.

Chelidonium majus, L.—Escaped plentifully about the city.

Euphorbia Cyparissias, L.—Escaped.

Trifolium reflexum, L.—Found on the summit of South Mountain.

T. agrarium, L., is quite common.

Aquilegia vulgaris, L.—The form with greenish white flowers has largely escaped in quite out-of-the-way places.

Rubus Dalibarda, L., though mentioned as rarely met with in the adjoining counties west, is quite plentiful at South Mountain wood.

Hypericum pyramidatum, Ait.—Plentiful.

Goodyera pubescens, R. Br.—So common in many places that a peck could be gathered without moving one's feet; a rarely beautiful sight, especially in the wooded slopes of South Mountain.

Habenaria psycodes, Gray.—A pure white variety was found. This plant was depauperate in every part except its magnificent spike.

Trillium erectum, L., var. *album*, Ph., was plentiful at South

Mountain last year; not an individual was gathered this season, though many searches were made.

Binghamton, N. Y. CHAS. F. MILLSPAUGH.

Pine-needles.—We read with interest, in the BULLETIN for August, just issued, that Mr. Meehan now is in accord with the botanical world in general in the belief that pine-needles "are true leaves, and not modifications of branches," as he has formerly taught. And really the reasons for his former opinion seem to be fairly overborne by the assigned reason for his conversion, namely, that in certain three-leaved fascicles of a pine, "each is a trifle shorter than the other."

Perhaps his suggestion that "all pines are monophyllous in the early stages of growth" because the needles of a bundle sometimes stick together for a while, but separate by "a light tap" on the apex, may be equally overborne by the consideration that this is incompatible with his statement "that a fascicle of pine-leaves is a depressed spiral," and by the fact that the adjacent needles of the bundle of white pine-leaves in question merely stuck together, but were never united.

A. GRAY.

The "Mocker-Nut."—The word *mocker*, in the name "mocker-nut," affords an example of an accomodated spelling due to a popular, though very erroneous, etymology. Michaux (Hist. des Arbres forestiers de l'Amer. Sept., i., 178–9) says of the fruit of *Carya tomentosa:*

"The shell, which is very thick, slightly striate, and of extreme hardness, contains a kernel which is sweet, but small, and difficult to extract on account of the very strong dissepiments that divide it; and it is probably for this reason that this species has been called the mocker-nut hickory." By this he would have us to understand that the nut was so called because it *mocks at* one's efforts to extract its kernel.

This explanation, notwithstanding its absurdity, has been copied into various books, and is, I think, the only one that has ever been offered; at least I have never met with any other.

It seems useless to mention the fact that to speak of a mocker nut in the sense assigned to the prefix by Michaux would be as un-English as it would be to speak of a cryer baby, a barker dog or a flower stream.

The *c* in the word *mocker* is epenthetic, and the name mocker-nut stands for (New York) Dutch *moker-noot*, 'heavy-hammer nut,' *i. e.*, one which, owing to the thickness of its shell, it takes more than a light hammer to crack.

The old and correct spelling, moker-nut, should be restored in botanical works, and the other, which is entirely meaningless, should be left to the trade-language of the nut-market, where perhaps it originated.

W. R. G.

Insular Vegetation.—Great Duck Island is one of the outer islands of Penobscot Bay, Maine, and lies about 12 miles south of Mt. Desert Island. It has a length of one and a half mile, with a breadth of less than half a mile. The following plants were noticed upon it, during a two hours visit on 26th of August last:

Ranunculus Cymbalaria, Pursh.
Coptis trifolia, Salisb.
Capsella Bursa-pastoris, Moench.
Viola.
Drosera rotundifolia, L.
Hypericum Canadense, L.
Elodes Virginica, Nutt.
Stellaria media, Sm.
Cerastium viscosum, L.
Sagina procumbens, L.
Oxalis Acetosella, L.
Potentilla Canadensis, L.
P. argentea, L.
P. Norvegica, L.
Pyrus Americana, DC.
Hippuris vulgaris, L.
Circæa alpina, L.
Epilobium coloratum, Muhl.
Aster acuminatus, Mx.
Achillea Millefolium, L.
Gnaphalium uliginosum, L.
Senecio vulgaris, L.
Cirsium lanceolatum, Scop.
C. arvense, Scop.
Vaccinium Pennsylvanicum, Lam.
V. Vitis-Idæa, L.
Chiogenes hispidula, T. & Gr.
Trientalis Americana, Pursh.
Euphrasia officinalis, L.
Lycopus Virginicus, L.
Scutellaria galericulata, L.
Polygonum incarnatum, Ell.
Rumex Acetosella, L.
Empetrum nigrum, L.
Abies nigra, Poir.
A. alba, Mx.
A. balsamea, Marsh.
Iris versicolor, L.
Smilacina bifolia, Ker.
Juncus.
Hordeum jubatum, L.
Hierochloa borealis, R. & S.
Aspidium spinulosum, Sw.
Osmunda (prob. *cinnamomea*, L.)

The species printed in Roman seem to be recent introductions on the cleared portions of the island, perhaps by the agency of sheep and birds. The remaining species belong to the flora of the neighboring mainland.

JOHN H. REDFIELD.

George W. Clinton, LL.D.—In Professor Gray's brief mention of the death of Judge Clinton (contained in the last number of the *American Journal of Science*), the statement is made that, at the time of his death, he was probably the oldest of American botanists. There seems to be no reason for questioning the fact; and thus in the death of this venerable man another of the links which united the students of the present generation with those of the past has been broken.

Judge Clinton belonged to a family renowned in the history of this State. His grandfather was General James Clinton of the Continental Army, his granduncle was George Clinton, the first governor of the State, and his father was DeWitt Clinton, also, for several terms, the governor of the State, and yet more greatly distinguished as the author and chief promoter of the scheme of internal improvements which raised the commonwealth to the foremost place in the sisterhood of states. DeWitt Clinton, himself, during his entire life, was a devoted student of nature. In a pre-eminent degree, he was the friend and patron of naturalists and men of science, finding in their

society and conversation the highest satisfaction. It is his name (because of his interest in science and especially botany) that is perpetuated in the genus *Clintonia* of Rafinesque. Samuel L. Mitchell, David Hosack and Amos Eaton, botanists of eighty years ago, were among his intimate friends. It is therefore not strange that in the influence of such associations, his son, the late Judge Clinton, should have found such taste for scientific pursuits as were his by inheritance strengthened and stimulated.

Born in New York City, on the 13th day of April, 1807, George William Clinton, as early as his eighteenth year, was a devoted student of botany and a zealous and indefatigable collector. A diary, kept by him at this early age, including the notes of an excursion made by him into the western part of the State, immediately after the completion of the Erie Canal, is still in existence to testify to that conscientious regard for scientific truth, which, to the close of his life, distinguished him. The little volume seems to recognize Professor Amos Eaton, of the Rennselaer Institute, as the guide of his botanical studies. His correspondence at this period, a portion of which is still preserved, shows that he was in receipt of letters from Rafinesque and others, whose names, to us, seem almost to belong to a mythological age.

His father died suddenly in February, 1828, while still governor; and, almost at once, upon the advice of near friends, among whom was Chief Justice Ambrose Spencer, he relinquished the study of medicine, to which he had already given the attention of two or three years, and, abandoning altogether the natural sciences, engaged with characteristic ardor and assiduity in the study of the law. As though to make his divorce from his earlier pursuits the more complete, he gave away his herbarium and his botanical library. Thereafter, for nearly half a century, he devoted himself to his profession, practising at the bar for more than twenty-three years, and, afterwards, occupying an honored place in the judiciary of the State for more than twenty-four years.

In 1836, he became a resident of Buffalo, where he lived until 1881, the recipient of the highest honors which his towns-people could bestow. His great ability and high character were recognized by the State in his appointment as one of the Regents of the University, in 1856; and Hamilton College, his *alma mater*, about the same time, honored him with the degree of Doctor of Laws.

In 1861, upon the establishment of the Buffalo Society of Natural Sciences, he accepted its presidency; and thereupon, returning to his first love, with all the devotion of his youth, he began an unremitting and most industrious exploration of the botany of the region in which he lived, giving to the undertaking almost all the leisure which remained after the performance of public and private duties. It may seem strange, yet the statement scarcely requires qualification, that in the interval of thirty-three years in which his attention had been turned aside from botanical pursuits, so complete had been his neglect of the favorite study of his early days, that, although he remembered a large proportion of the native plants of his neighborhood, he was almost entirely unacquainted with the natural system of

classification of plants, and with the changes in their nomenclature. But the fact was to him only a trifling and temporary obstacle; and he was soon perfectly familiar with the leading principles of modern botanical classification.

It was characteristic of Judge Clinton that in his most earnest labors there was no thought of self. His arduous and unremitting efforts in the establishment of a herbarium in Buffalo were wholly for the benefit of the Society of which he was the chief. He collected most abundantly, and his specimens, by exchange, went into many hands. Those which he received in return were added to the collection of the Society, until, at the time when he removed from Buffalo, it embraced, as is supposed, specimens of more than 20,000 species of plants. These had all been mounted, labeled, arranged and catalogued by his own hands. The collection thus illustrates not only the flora of his neighborhood, but, very largely, that of the world.

How often his researches were rewarded by the discovery of plants not previously known or suspected in the vicinity of Buffalo, the later editions of Gray's Manual will bear witness. No name occurs more frequently than his as the authority that a certain plant occurs in some named locality. Yet, perhaps, after all, the abundance of species of the plants of Buffalo, as compared with those of other places, may prove to be due rather to the persistency and completeness of his explorations than to the fact that the vicinity of Buffalo is especially rich in species.

His labors being confined almost entirely to the neighborhood of Buffalo, the plants new to science which were detected by him could not be great in number. *Scirpus Clintonii*, Gray, *Aspidium cristatum*, Swartz, var. *Clintonianum*, Eaton, and several fungi, described by Mr. Peck, perpetuate his name.

Judge Clinton possessed, in a remarkable degree, the gift of eloquence. Upon topics of a scientific character he was a frequent and delightful speaker. The public was always anxious to hear him. It is probable, however, that his contributions to the press will be longest remembered. His style was most agreeable. Many of the observations which he made in his excursions were published in a series of papers printed in the Sunday *Courier*, of Buffalo, entitled "Notes of a Botanist." Nothing, perhaps, more characteristic of the man ever emanated from his pen. They aimed at none of the startling attempts at hypothesis and generalization which have been not inaptly called the "romance of science." He could present the truth with almost photographic fidelity, and yet, by the charm of a style of unusual beauty, he could make his matter as agreeable as a fairy tale.

His removal to Albany, in 1881, was occasioned by his being called there to arrange for publication the papers of Gov. George Clinton, now the property of the State. He found this labor one of great pleasure. Yet he would at times indulge himself in a botanical excursion into the suburbs of the city. In one of these, which he undertook on the 7th of September, 1885, he visited the Rural Cemetery, where, within a short time after he had passed through its gates, he was found dead. Only a few minutes before, he had been seen

gathering botanical specimens, and apparently in as perfect health as can attend old age.

Thus at the very close of life, he was in the enjoyment of the things which he had always loved so well—the green turf, the blue sky and the sweet, autumnal air.

"Then with no fiery, throbbing pain,
No cold gradations of decay,
Death broke at once the vital chain,
And freed his soul the nearest way."

DAVID F. DAY.

Botanical Notes.

*Botanical Work of the American Association for the Advancement of Science.**—The Ann Arbor meeting of the Association, just closed, proved of more than usual interest to the botanists. There was a notable increase in the permanent value of the papers. They were more thoughtful, as a rule, than those presented at previous meetings, and came up more nearly to the standard demanded by the science of to-day. Below we give brief abstracts, which will show the general nature of the papers.

"An Observation on the Hybridization and Cross-breeding of Plants," by E. Lewis Sturtevant. This gave in detail the observations on crossed beans, maize, barley, peppers, tomatoes, lettuce and peas, made at the New York Agricultural Experiment Station. As a result of the observations the author concludes that in our domesticated vegetable plants cross-fertilization shows its effects at once in the reproduction of the form-species and varieties which are involved in the parentage of the crossed seed, or, in other words, the effect is *atavism* rather than a blending of properties.

"Germination Studies," by the same author, gave the results of making numerous duplicate germinations, showing that different percentage-results are obtained as the quantity of seeds used is large or small. The influence of various temperatures was also discussed.

"The Question of Bisexuality in the Pond-scums," by Charles E. Bessey. It has been held by some botanists that the pond-scums (Zygnemaceæ) show a distinct bisexuality, one of the filaments being male, the other female. Certain facts were presented which render such a view untenable. In many plants the cells of the same filament fertilize one another, as is notably the case in the forms which have been described as *Rhynchonema*. Several cases of hybridization were cited in which two filaments, both of which bore resting-spores, united with one another and produced a hybrid spore. The conclusion was that the pond-scums are not bisexual, but rather unisexual, that is, that while sexuality undoubtedly exists, there is as yet no differentiation into the proper male and female. Accordingly these plants must take a position just above the asexual prototypes, but below the clearly bisexual oöphytes.

"The Process of Fertilization in *Campanula Americana*," by Charles R. Barnes. This species is strongly proterandrous. The

* From the *American Naturalist*.

pollen is scraped out of the anthers by the hairy style and brushed off before the stigmas open, thus securing cross-fertilization. The development of the pollen is normal. The stigmas are held together till mature by interlocking papillæ. The hairs on the style become partially introverted, thus freeing the pollen.

The pollen-spore contains two nuclei, the larger of which, the vegetative, becomes disorganized shortly after entering the pollen-tube, while the smaller spindle-shaped generative nucleus persists.

The embryo-sac is cylindrical, with a gradual enlargement near the micropylar end, where is located the egg-apparatus, and an abrupt enlargment at the chalazal end, in which lie the antipodal cells. There are usually two sac-nuclei.

The pollen-tubes enter the style *between* the bases of the papillæ of the stigma, pass down in the strands of conducting tissue, and *not* through the central canal, around which this tissue is arranged. The paper was followed by an account of the methods used, and illustrated by figures drawn upon a large chart.

"Proof that Bacteria are the direct Cause of the Disease in Trees known as Pear-blight," by J. C. Arthur. Cultures of the bacterium taken from blighted twigs were made in sterilized corn-meal juice. After a few days some of the bacteria, which had increased rapidly in this medium, were transferred (a drop only) to another sterilized preparation of corn-meal juice. After a few days another transfer was made, and this was continued until the sixth culture had been reached, when there was presumably but an infinitesimal amount of the original diseased juice present. Inoculations made with the bacteria of the last culture resulted in producing the blight as certainly and rapidly as in the first case.

The crucial experiment was made by filtering a watery solution containing the bacteria, and then inoculating with the bacteria on the one hand and the filtration on the other, resulting in blight in the former and none at all in the latter case.

"The Mechanical Injury to Trees by Cold," by T. J. Burrill. There are two kinds of mechanical injury due to a low temperature, viz.: (1) The cracking and splitting of the bark and wood in a longitudinal-radial direction; and (2) the separation of the concentric layers of wood and bark, and especially the rupture of the cambium, thus destroying the bark and perhaps also killing the tree.

The first injury is due to the shrinking of the tissues by cold. The second is due to the growth of ice-crystals in the annual rings on the surface of the wood.

"Further Observations on the Adventitious Inflorescence of *Cuscuta glomerata*," by Charles E. Bessey. A further examination shows that it is the universal rule of this species for the infloresence to develop from lateral adventitious buds, and that no normal inflorescence is developed. The adventitious infloresence always bears a definite relation to the parasitic roots; that portion of the stem which bears roots produces adventitious inflorescence, and the greater the number of roots the greater the mass of infloresence. No adventitious inflorescence is produced upon any portion of the stem which does not bear roots.

The stem proper (main axis) all dies away very soon, not only between the inflorescences, but in the masses of inflorescence also. The flowering stems soon establish direct structural relations with the root, and thus with the host-plant. Of other species thus far examined, *Cuscuta arvensis* does not produce adventitious inflorescence, while *C. chlorocarpa* and *C. Gronovii* produce an abundance of both the normal and the adventitious flower-clusters, and in both cases the flowers, fruits and seeds appear to be well developed.

"On the Appearance of the Relation of Ovary and Perianth in the Development of Dicotyledons," by John M. Coulter. An examination of many species of dicotyledons (belonging to the orders Ranunculaceæ, Leguminosæ, Rosaceæ, Saxifragaceæ, Onagraceæ, Rubiaceæ, Umbelliferæ, Compositæ, Borraginaceæ, Scrophulariaceæ and Labiatæ) shows that in every case the first character recognized in the development of the flower is that of interior or superior ovary, and that a most simple grouping of the orders upon that basis is possible. Grouping the dicotyledons upon this basis results somewhat as follows: The Compositæ take place at the head of the list, then near them come the Umbelliferæ, Rubiaceæ, etc., etc., The intermediate orders whieh have inferior and superior ovaries, as the Rosaceæ and Saxifrageceæ, would occupy a proper intermediate position, and finally those with superior ovary or ovaries only, as the Scrophulariacæ, Labiatæ, Leguminosæ, etc., would be arrayed in a descending series.

"The Development of the Prothallium in Ferns," by Douglass H. Campbell. The paper gave the details of many observations upon the development of the prothallia of ferns, accompanied with figures of the various stages.

"Notes upon some Injurious Fungi of Californa," by William G. Farlow. The author observed *Peronospora Hyoscyami*, D. By., growing abundantly upon *Nicotiana glauca*, a shrubby plant, native of Buenos Ayres, which is now common in Northern Mexico and Southern California. As the shrub is a near relative of the cultivated tobacco, *Nicotiana Tabacum*, there is danger that the parasite may be transferred from the former to the latter.

The hollyhocks of California are affected by a rust (*Puccinia* of some species) which was at first supposed to be identical with the hollyhock disease of Europe (*Puccinia malvacearum*). It is, however, entirely distinct, being the same species as that which occurs upon species of *Malvastrum* in some of the Western States. There is danger that this may become transferred to the cotton-plant.

"A new Chromogenous *Bacillus*," by D. E. Salmon and Thomas Smith. A *Bacillus*, named *B. luteus suis*, was found in the pericardial effusion of hogs affected with swine plague.

The Botanical Club of the A. A. A. S.—About seventy members of the Association registered themselves as botanists at the Ann Arbor meeting. Every member of the club wore a yellow ribbon in addition to the regular association badge. Six sessions of the club were held in the university buildings, one of them occuring in the botanical laboratory.

During the first session a committee was appointed to take into

consideration the question of English names for the fungi and the diseases produced by them. The committee is composed of J. C. Arthur of Geneva, N. Y., Wm. G. Farlow, Cambridge, Mass., and Wm. Trelease of St. Louis, Mo., who are to act in conjunction with F. L. Scribner of Washington, D. C.

A committee was also appointed to take into consideration the relations of the botanists of the country to the National Herbarium at Washington. This committee, consisting of John M. Coulter of Crawfordsville, Ind., and Wm. J. Beal of Lansing, Mich., reported in favor of asking that the herbarium prepare a catalogue of its specimens and books so that botanists may know what is to be found in it for consultation, and also in order that desiderata may be known to those who are able to supply them.

Professor Beal read a few notes upon laboratory methods. This was followed by discussion and a general interchange of notes.

Professor Halsted exhibited specimens of a wild grape from Iowa completely covered with *Peronospora viticola*. Near these specimens were many vines whose leaves were free from the parasite, but whose *berries* were badly affected.

D. H. Campbell exhibited an organism from the Detroit River which he thought to be an alga. Other members doubted its vegetable nature. It was referred for further examination and study.

Professor Coulter presented a list, with comments, of the plants collected by the Greely expedition.

Professor Barnes described the peculiar dehiscence of the fruit of *Campanula Americana*, in which a peculiar little flap opens and lets the seeds out when the weather is dry, but closes when it is wet.

Professor Lazenby presented an additional list of plants new to the Ohio flora.

During the session in the botanical laboratory the whole time was given to the discussion of laboratory methods, and examination of various microscopes and of the laboratory books on the shelves in the room.

Professor Burrill called attention to the grape disease due to *Sphaceloma ampelina*, D. By. Specimens were exhibited and passed around among the members of the club.

Mrs. Wolcott described au abnormal form of *Campanula* which had suddenly appeared in her garden, and which provoked a discussion on weed-seeds in which it was suggested that many weeds survive in fields and meadows by the yearly growth of depauperate plants which, though small, produce perfect seeds.

Professor Barnes showed that the figures of the stomata of *Marchantia polymorpha* given in most books are erroneous in not showing the guard-cells, which lie at the bottom of the chimney-like structure.

F. L. Scribner gave some hints upon the making of drawings from botanical specimens.

Geo. U. Hays, of St. Johns, N. B., sent a paper on the botanical features of New Brunswick, which was read by the secretary. The low temperature and damp air have affected the flora so that it is quite peculiar.

Professor Bessey described his herbarium cases, which have doors that are readily removed entirely, and that he uses for tables by placing them upon trestles or flat-backed chairs.

D. H. Campbell described the germination of *Botrychium* spores in so far as his observations had progressed. He succeeded in germinating the spores by constructing a box in such a way that the spores were under ground.

He also called attention to the crystals in the petiole of *Onoclea*

J. C. Arthur exhibited specimens of Nepaul barley (*Hordeum trifurcatum*) in which the awns take a hood-like development, and in this hood additional flowers are found. The structure is very puzzling, as it appears that here a flowering-glume (outer palet of the older books) bears flowers towards its upper extremity.

Dr. Walker, of New Orleans, mentioned a case of degeneracy of Indian corn. Kernels of Nebraska corn were planted in a pot in New Orleans, and produced perfect fruiting plants only fifteen inches in height.

The officers for the next meeting are John M. Coulter of Crawfordsville, Ind., chairman; J. C. Arthur of Geneva, N. Y., secretary.

The Chemical Action of Light on Plants.—Professor A. Vogel, in a communication to the "Sitzungsberichte der Munchener Akademie," brings into prominence the fact that the hemlock plant, which yields coniine in Bavaria, contains none in Scotland. Hence he concludes that solar light plays a part in the generation of the alkaloids in plants. This view is corroborated by the circumstance that the tropical cinchonas, if cultivated in our feebly lighted hothouses, yield scarcely any alkaloids. Prof. Vogel has proved this experimentally. He has examined the barks of cinchona plants obtained from different conservatories, but has not found in any of them the characteristic reaction of quinine. Of course it is still possible that quinine might be discovered in other conservatory-grown cinchonas, especially as the specimens operated upon were not fully developed. But as the reaction employed detects very small quantities of quinine, it may be safely assumed that the barks contained not a trace of this alkaloid, and it can scarcely be doubted that the deficiency of sunlight in our hothouses is one of the causes of the deficiency.

It will at once strike the reader as desirable that specimens of cinchonas should be cultivated in hothouses under the influence of the electric light, in addition to that of the sun.

If sunlight can be regarded as a factor in the formation of alkaloids in the living plant, it has, on the other had, a decidedly injurious action upon the quinine in the bark stripped from the tree. On drying such bark in full sunlight the quinine is decomposed, and there are formed dark-colored, amorphous, resin-like masses. In the manufacture of quinine, the bark is consequently dried in darkness.

This peculiar behavior of quinine on exposure to sunlight finds its parallel in the behavior of chlorophyll with the direct rays of the sun. It is well known that the origin of chlorophyll in the plant is entirely connected with light, so that etiolated leaves growing in the dark form none. But as soon as chlorophyll is removed from the

sphere of vegetable life, a brief exposure to the direct rays of the sun destroys its green color completely.

Professor Vogel conjectures that the formation of tannin in the living plant is to some extent influenced by light. This supposition is supported by the fact that the proportion of tannin in beech or larch bark increases from below upward—that is, from the less illuminated to the more illuminated parts, and this in the proportions of 4:6 and 5:10.

Sunny mountain slopes of a medium height yield, according to wide experience, on an average the pine-barks richest in tannin. In woods in level districts the proportion of tannin is greatest in localities exposed to the light, while darkness seems to have an unfavorable effect. Here, also, we must refer to the observation that leaves exceptionally exposed to the light are relatively rich in tannin.

We may here add that in the very frequent cases where a leaf is shadowed by another in very close proximity, or where a portion of a leaf has been folded over by some insect, the portion thus shaded retains a pale green color, while adjacent leaves, or other portions of the same leaf, assume their yellow, red, or brown autumnal tints. If, as seems highly probable, these tints are due to transformation products of tannin, we may not unnaturally conclude that they will be absent where tannin has not been generated.—*Jour. of Science.*

Boxwood, which is almost exclusively used for wood engraving, is becoming more and more scarce. The largest wood comes from the countries bordering on the Black Sea. The quantity exported from Poti direct to England is immense; besides this, from 5,000 to 7,000 tons of the finest quality, brought from Southern Russia, annually pass through Constantinople. An inferior and smaller kind of wood, supplied from the neighborhood of Samsoun, is also shipped at Constantinople to the extent of about 1,500 tons annually. With regard to the boxwood forests of Turkey, the British consul at Constantinople reports that they are nearly exhausted, and that very little really good wood can be obtained from them. In Russia, however, where some little government care has been bestowed upon forestry, a considerable quantity of choice wood still exists; bui even there it can only be obtained at an ever-increasing cost, as the forests near the sea have been denuded of their best trees. The trade is now entirely in English hands, although formerly Greek merchants exclusively exported the wood. In the province of Trebizonde the wood is generally of an inferior quality; nevertheless, from 25,000 to 30,000 cwt. are annually shipped, chiefly to the United Kingdom.

Seeds of Weeds—The botanist of the Ohio Agricultural Station has been counting and estimating the number of seeds found upon a single plant of the most obnoxious weeds grown in that State. In the shepherd's purse he found the number of seeds in a medium-sized plant, 37,500; in the dandelion, 12,100; wild pepper-grass, 18,400; wheat-thief (*Lithospermum arvense*), 7,000; the common thistle (*Cirsium lanceolatum*), 65,366; camomile, 15,920; butter-weed, 8,587; rag-weed, 4,366; common purslane, 388,800; common plantain, 42,200; burdock, 38,860.

Procuring Fire with the Bamboo.—In the new edition of Mason's

"Burma" we read that among other uses to which the bamboo is applied, not the least useful is that of producing fire by friction. For this purpose a joint of thoroughly dry bamboo is selected, one and a half inch or two inches in diameter, and this joint is then split into halves. A ball is now prepared by scraping off shavings from a perfectly dry bamboo, and this ball being placed on some firm support, as a fallen log or piece of rock, one of the above halves is held by its ends firmly down on it, so that the ball of soft fibre is pressed with some force against its inner or concave surface. Another man now takes a piece of bamboo a foot or less long, and shaped with a blunt edge, something like a paper-knife, and commences a sawing motion backward and forword across the horizontal piece of bamboo, and just over the spot where the soft fibre is held. The motion is slow at first, and by degrees a groove is formed, which soon deepens as the motion increases in quickness. Soon smoke arises, and the motion is now made as rapid as possible, and, by the time the bamboo is cut through, not only smoke but sparks are seen, which soon ignite the materials of which the ball beneath is composed. The first tender spark is now carefully blown, and when well alight the ball is withdrawn, and leaves and other inflammable materials heaped over it, and a fire secured. This is the only method that I am aware of for procuring fire by friction in Burma.

Another method of obtaining fire by friction from bamboos is thus described by Captain T. H. Lewin ("Hill Tracts of Chittagong, and the Dwellers therein," Calcutta, 1869, p. 83), as practiced in the Chittagong Hills. The Tipporahs make use of an ingenious device to obtain fire; they take a piece of dry bamboo, about a foot long, split it in half, and on its outer round surface cut a nick, or notch, about an eighth of an inch broad, circling round the semi-circumference of the bamboo, shallow toward the edges, but deepening in the centre until a minute slit of about a line in breadth pierces the inner surface of the bamboo fire-stick. Then a flexible strip of bamboo is taken, about one and a half foot long and an eighth of an inch in breadth, to fit the circling notch, or groove, in the fire-stick. This slip or band is rubbed with fine dry sand, and then passed round the fire-stick, on which the operator stands, a foot on either end. Then the slip, grasped firmly, an end in each hand, is pulled steadily back and forth, increasing gradually in pressure and velocity as the smoke comes. By the time the fire-band snaps with the friction there ought to appear through the slit in the fire-stick some incandescent dust, and this placed, smouldering as it is, in a nest of dry bamboo shavings, can be gently blown into a flame.—*The Gardeners' Chronicle.*

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New North American Arthoniæ.

The learned Dr. Nylander of Paris has had the goodness to examine a collection of North American *Arthoniæ* sent him by me, and has published the descriptions of several new species in Nos. 16 and 24 of the Regensburg *Flora* of the present year, and which are here reproduced for the benefit of our lichenists.

I have to regret that Dr. Nylander was prevented by ill health and his numerous occupations from determining all the specimens sent him, but I am not without hopes that he may yet find himself able to do so. As being, as it were, the creator of the genus, no one else is so capable as he.

I would observe that *A. pyrrhuliza*, Nyl., has been distributed as *A. pyrrhula*, which, from the description, is quite a different plant. Of this, those with whom I have made exchanges will please take notice.—H. Willey.

Fastidiosum sane est novas species describere et infinitas ita minuties videri confusas exhibere. Sed non prætervideatur in scriptis præsertim hodiernis anatomicis vel physiologicis etiam multo magis prodiens nisus res minutulas inutiles amplissime prolixissimeque enarrare minutissimaque acriter consectari, ita ut meritum evadat prolixitas.

Novæ species expositæ parvi sunt momenti nisi ubi addunt notas ad alias species jam cognitas satius distinguendas et ubi constituendo systemati utiles sunt; unde sequitur, nullas descriptiones esse bonas sine additione notarum talium comparantium et simul descriptores parum cognitionibus generalibus methodoque optima initiatos vix descriptiones ullas rite facere valere.

Hic seriem incipimus Arthoniarum Americæ borealis, quas submisit præstantissimus H. Willey.

1. *Arthonia sanguinea*, Will.—Thallus vix ullus; apothecia obscure sanguinea, superficialia, oblonga vel subrotundata (latit. circiter 0.5 $^{mm.}$), convexula intus obscura; sporæ 8næ incolores ellipsoideæ murali-divisæ, longit. 0.022—30$^{mm.}$, crassit. 0.011—14$^{mm.}$ Iodo gelatina hymenialis cœrulescens, sporæ fulvo- rubescentes.

In California super corticem et lignum. Species mox distincta colore apotheciorum. Maxime accedens sit *A. distendens*, Nyl., e Cuba (inde a C. Wright data n^{is} 154 et 156), cui apothecia nigra et sporæ multo majores (longit. 0.073—90$^{mm.}$, crassit. 0.024—27$^{mm.}$)

2. *Arthonia xylographica*, Nyl.—Thallus macula pallescente indicatus; apothecia nigra adpressa lanceolato-difformia (latit. circiter 0.25

mm.). vel subastroidea; sporæ 8næ ovoideo- oblongæ 3-septatæ, longit. 0.012—15mm., crassit. 0.004—5mm. Iodo gelatina hymenialis cœrulescens, dein protoplasma thecarum fulvescens.

Super lignum *Vaccinii corymbosi* in paludibus prope New Bedford. Forsan sola subspecies *A. astroideæ*, a qua præsertim sporis nonnihil minoribus et reactione iodica differt. Gonidia vix ulla.

3. *Arthonia subastroidella*, Nyl.—Thallus vix ullus; apothecia nigra minuta, confuse astroidea, inæqualia; sporæ 8næ oviformi-oblongæ 3-septatæ, longit. 0.011—12mm., crassit 0.004—5mm. Iodo gelatina hymenialis vix reagens, protoplasma thecarum fulvo-rubescens.

Super corticem *Coryli* ibidem. Affinis *A. astroideæ* vel potius *epipastoidi*, Nyl., sed reactione indicata differens.

4. *Arthonia quintaria*, Nyl.—Thallus macula pallescente indicatus; apothecia nigra subastroidea, minus divisa; sporæ 8næ oviformi-oblongæ 5-septatæ, longæ 0.018—21mm., crassit. 0.007—8mm., loculo supero majore. Iodo gelatina hymenialis et protoplasma thecarum vinose rubescens.

In Nova Cæsarea super corticem lævem. Affinis *A. astroideæ*, simplicior figura et sporis jam distincta. In *A. obscura*, Ach., sporæ minores.

5. *Arthonia subminutula*, Nyl.—Thallus vix ullus; apothecia nigra tenera gracilenta astroideo-ramosa inæqualia; sporæ 8næ oviformes 1-septatæ, longit. 0.011—15mm., crassit. 0.004—5mm. Iodo gelatina hymenialis vinose rubescens.

Super corticem *Pini Strobi* lævem ad N. Bedford. Species minutella affinis *A dispersæ*, Schrad. (*A. minutula*, Nyl., *Arth.* p. 102), sed apotheciis ramosis, reactione alia.

6. *Arthonia Hamamelidis*, Nyl.—Similis *A. astroideæ*, sporis minoribus (3-septatis), longit. 0.011—12mm., crassit. 0.004mm. differens et ab *A. astroidella* subsimili iodo gelatina hymeniali cœrulescente, dein fulvo-rubescente, protoplasmate thecarum similiter tincto.

Super corticem *Hamamelidis Virginicæ* ad New Bedford (H. Willey).

7. *Arthonia fissurinea*, Nyl.—Thallus macula alba vel albicante, lævigata, indicatus; apothecia pallida innata sublanceolata concaviuscula (latit. circiter 0.2mm.), margine thallode parum distincto; sporæ 8næ incolores oviformi-oblongæ, æqualiter 7—9-septatæ, longit. 0.028—32mm., crassit. 0.009—0.011mm. Iodo gelatina hymenialis cœrulee tincta, dein fulvo-rubescens (sporæ etiam sic tinctæ).

Corticola in Florida. Species affinis *A fissurinellæ*, sed magis albicans et apotheciis pallidis (nec incoloribus) etc.

8. *Arthonia pyrrhuliza*, Nyl.—Thallus albidus opacus, tenuiter obscure limitatus; apothecia rubricosa obscuriora, gracilescentia, varia, varie divisa; sporæ 8næ fuscæ 3-septatæ, longit. 0.012—15mm., crassit. 0.0045mm. Iodo gelatina hymenialis cœrulescens, dein fulvescenti-rubescens.

Super *Ilicis* corticem prope New Bedford (H. Willey). Sporis obscuratis mox differt a comparandis, quales sunt *A. pyrrhula* et *A. Cascarillæ*, Fée, quarum definitiones hic addere liceat:

A. pyrrhula, Nyl., Enumer. Lich. suppl. p. 337 (nomen).—Thallus

macula albicante lata, satis determinata indicatus; apothecia coccinea linearia, subsimplicia aut parum ramulosa, angulatim sæpe flexuosa, innata, plana, opaca; sporæ 6—8næ incolores, 5—6-septatæ, oblongæ, sat magnæ, longit. 0.030—36$^{mm.}$, crassit. 0.015$^{mm.}$, utroque apice fere æquales loculoque apicali utroque parvo subæquali. Iodo gelatina hymenialis vinose rubens (passim præcedente cœrulescentia).

Super cortices in Carolina (hb. Tuck.) Differt ab *A. cinnabarina* apotheciis gracilentis, sporis aliis.

A. Cascarillæ (Coniocarpon, Fée Ess. p. 98, t. 15, f. 4). Thallus albidus parum conspicuus, indeterminatus; apothecia obscure violacea vel fusca vel obsolete violacee tincta, innata, minuta, sat crebra, rotundata vel nonnihil difformia; sporæ 8næ incolores oblongo-oviformes 3-septatæ, longit. 0.014—16$^{mm.}$, crassit. 0.005$^{mm.}$ Iodo gelatina hymenialis intensive cœrulescens, dein fulvescens.

Super corticem *Crotonis Cascarillæ*. Vix differens ab *A. adspersa* (Mnt.) nisi apotheciis minoribus simplicioribua.

9. *Arthonia diffusa*, Nyl., Enumér. Lich. suppl. p. 337 (nomen). Thallus albus vel albidus, tenuis, effusus, opacus, sæpe tenuissimus; apothecia nigra sparsa rotundata vel nonnihil difformia (latit. 0.3—0.7 $^{mm.}$), innata plana vel convexiuscula, intus albicantia; sporæ 8næ incolores oblongo-oviformes 3-septatæ, longit. 0.009—0.013$^{mm.}$, crassit. 0.0035—0.0045$^{mm.}$ Iodo gelatina hymenialis cœrulescens.

Corticola. Facie fere *A. cinereopruinosæ*, Schaer., sed sporis minoribus. Spermatia oblonga.

10. *Arthonia impallens*, Nyl.—Subsimilis *A. stenographellæ*, Nyl., Nov. Granat. 2, p. 99, sed apotheciis omnino pallidis. Sporæ ovoideo-oblongæ 2—3-septatæ, longit. 0.011—12$^{mm.}$, crassit. 0.0035—45$^{mm.}$ Iodo gelatina hymenialis cœrulescens. dein vinose fulvo-rubescens.

In New Jersey, supra *Ilicem* (Eckfeldt).

11. *Arthonia terrigena*, Will.—Thallus vix ullus visibilis; apothecia nigra minutella lecideoliformia (latit. fere 0.2$^{mm.}$); sporæ 8næ incolores vel dilute fuscescentes oviformi-oblongæ 1-septatæ, longit. 0.011—12 $^{mm.}$, crassit. 0.0035$^{mm.}$ Iodo gelatina hymenialis non tincta, protoplasma thecarum vinose rubens.

Supra terram humosam nudam locis umbrosis prope New Bedford (Willey). Species inconspicua infima., cum nulla alia comparanda.

12. *Arthoria subminutissima*, Nyl.—Thallus nullus visibilis; apothecia nigra minutissima rotundata vel oblonga (latit. vix 0.1$^{mm.}$); sporæ 8næ incolores oblongo-oviformes 1-septatæ, longit. 0.007—9$^{mm.}$ crassit. 0.003 $^{mm.}$ Iodo gelatina hymenialis vinose fulvescens.

Pinicola prope New Bedford. Comparanda cum *A. minutissima* (Ach.) Nyl., Scand. p. 263, quæ sporas habet majores.

Observatio.

Arthonia patellulata, f. *subpallidiuscula*, apotheciis humidis obscure pallescentibus. Super corticem *Hamamelidis* prope New Bedford.

Quercus gra,—While riding along the turnpike from Dix Hills to Comac, Suffolk County, I noticed an oak which I was satisfied was new to me. It seemed to be quite plentiful in that light, sandy soil. On my return home I found it to be *Quercus nigra*. As I have

botanized over almost the whole county, I think it is confined to that (limited) locality, or I should have observed it before.

Wading River, L. I. E. S. MILLER.

Dr. Asa Gray's Seventy-fifth Birthday.—The seventy-fifth anniversary of the birth of Dr. Gray occurred on the 18th of November, when a number of American botanists united in presenting him with a highly artistic vase as a token of their esteem.

This vase, which we represent herewith from *Science*, was presented on the morning of the 18th, without formality. It is about eleven inches high, and is appropriately decorated *en repoussé* with those plants which are distinctively American, and which are most closely associated with Dr. Gray. The place of honor on one side is held by *Grayia polygaloides*, and on the other by *Shortia galacifolia*. Among others, *Aster Bigelovii*, *Solidago serotina*, *Lilium Grayi*, *Centaurea Americana*, *Notholæna Grayi* and *Rudbeckia speciosa* are prominent.

The vase stands upon an ebony pedestal, which is surrounded by a silver hoop bearing the inscription:

1810—November eighteenth—1885.

ASA GRAY

in token of the universal esteem

of American botanists.

The idea was originated and carried out by the editors of the *Botanical Gazette*, and was a complete surprise to Dr. Gray.

Pine-needles.—It is very pleasant to have my friend Dr. Gray's congratulations on my conversion as to the nature of pine-leaves. If the "botanical world" had given me the evidence, instead of allowing me to work it out for myself, the happy event need not have been so long delayed. And, of course, if I am now convinced that a fascicle of pine-needles is really but the leaves from a suppressed branch, I

can have no hesitation in adopting the terms "early stuck together" instead of "monophyllous in the early stages," if that will make the idea clearer, for it was precisely my object to show that the term monophyllous as applied to the pine was simply a case of the "early sticking together" of the leaves of the plant.

THOMAS MEEHAN.

To Botanists.—I have published a Catalogue or Check-List of the Phænogamous and Vascular Cryptogamous Plants of North America, containing the names of nearly 10,000 species. It is, so far as I know, the most complete list ever published of the plants of this country. It contains 112 pages, and will be found of the utmost utility as an auxiliary to the successful arrangement of a herbarium, and invaluable for making exchanges.

Paola, Kansas. J. H. OYSTER.

Botanical Notes.

Systematic Position of the Bacteria.—In a Review of recent works on bacteria, Dr. C. Fisch (*Biolog. Centrabl.* v., pp. 97–102) shows that the assignment of the Schizomycetes to the fungi does not rest upon a sound morphological basis, the physological resemblance in the absence of chlorophyll not being sufficient of itself to show a genetic affinity. The history of development furnishes conclusive evidence against the Schizomycetes being connected with the fungi phytogenetically, either as an early form of development or as the result of retrogression. The nearest affinity of the bacteria lies unquestionably with certain green organisms, *Nostoc*, *Oscillaria*, etc., included under the Schizophyceæ or Cyanophyceæ; and these form together a natural group of Schizophyceæ, with no close affinity to any group of fungi. According to our present state of knowledge, the Schizophyta must be regarded as displaying the nearest genetic affinity with the Flagellata.—*Journ. Royal Microscop. Soc.*

The Filmy Ferns of Jamaica.—Under this title, Mr. J. H. Hart has contributed to the *West Indian Field* an interesting article to which he appends a list of all the *Trichomanes* and *Hymenophylla* known to inhabit the island of Jamaica—22 species of the former and 13 of the latter.

Forestry Statistics.—At the American Forestry Congress, recently in session in Boston, some very valuable statistics were presented relative to the timber supply of this country. The land area of the United States is placed at 1,856,070,400 acres; total forest area,440,990,000 acres; total farm area, 295,650,000 acres. Of unimproved and waste lands, including "old fields," there are 1,115,430,400 acres. There are 150,000 miles of railway, including side tracks. It has required 396,000,000 ties for their construction. Supposing that the ties require to be renewed once in six years, and that 10,000 miles of new road are built annually; if twenty-five years be allowed as the time necessary for trees to attain a size suitable for making ties, then it would require 15,000,000 acres of standing timber to supply the annual demand for them. But with the increase of railroads, it is to be considered that the annual demand for ties is all the while increasing.

The census reports the consumption of 145,778,137 cords of wood and 74,000,000 bushels of charcoal for fuel in dwellings, stores, factories, steamboats and locomotives. This in a single year would clear the forests from an area of 30,000,000 acres. The census also reports that in 1880 forest fires consumed the trees on 10,274,089 acres, and there is no reason to believe that a less area will be burned over than in 1880. The census gives the amount of lumber cut in 1880 as 18,000,000,000 feet. Last year the cut had increased to 28,000,000,000 feet, which would lay bare an area of 5,600,000 acres. Altogether, it appears that the forests of the country are subject to an annual drain of 50,750,089 acres. It may well be inquired how long the forests can endure this drain—how long the country can bear this rapid destruction of the most important material element of its prosperity.

The Shaw School of Botany, endowed by Mr. Henry Shaw as a Department of Washington University, at St. Louis, was formally inaugurated on the 6th instant., the address being delivered by Mr. William Trelease, who has been appointed to the chair of botany, which is to be known as the Engelmann Professorship. The work of the school, outside of the University classes, will begin with the formation of a class for the study of grasses. A class in analytical botany will take up the study of spring flowers on Tuesday and Thursday afternoons and Saturday mornings, from April 6th till June 12th, 1886.

Distribution of Crystals of Oxalate of Calcium in the Leaves of Leguminosæ.—Some investigations on this subject have been made by Prof. J. P. Borodin, who has examined 660 species with the following results: In the Mimoseæ the occurrence of the crystals is very constant, and they are arranged in a solitary manner parallel with the veins. In the Cæsalpineæ the distribution is the same, but, in addition, there are clusters of crystals scattered through the parenchyma of the leaf. These do not occur in the Papilionaceæ. In the Papilionaceæ there are three principal types: (1) Crystals altogether wanting (in the Genisteæ, many Galegeæ, as *Astragalus* and *Colutea*, and some genera of other groups; (2) clinorhombic crystals along the veins (in the Vicieæ and Trifoliaceæ), and clinorhombic crystals scattered through the parenchyma (in some Phaseoleæ and Galegeæ); clinorhombic crystals in groups in the epidermis (in *Dioclea* and *Canvalia*), and crystals in the membrane of the epidermis (in *Stylosanthes*). When crystals are wanting in the leaves, they are deficient also in the stem. (*Jour. Roy. Micros. Soc.*) These investigations after further elaboration may perhaps serve as a clue to the genus to which any leguminous plant belongs, in cases in which only a leaf can be obtained.

Experiments in Crossing Solana.—Some interesting experiments have lately been made by Messrs. Sutton, of Reading, in the crossing of potatoes already in cultivation with the *Solanum Maglia* of littoral Chili and with *S. Commersoni*. Hybrids with *S. Maglia* have been obtained, but a cross could not be effected with *S. Commersoni*. The same firm has also made the curious experiment of fertilizing the "Victoria" potato with the pollen of a tomato, and other potatoes with the pollen of *Solanum Dulcamara* and *S. nigrum*, reversing the

cross in some instances. From these cross-fertilizations seed has been obtained, and the result of their cultivation will be awaited with interest.—*Gardeners' Chronicle.*

Variations in Quercus prinoides.—At a meeting of the Philadelphia Academy of Natural Sciences, August 4th, Mr. Meehan exhibited a series of fruiting specimens of branches of *Quercus prinoides.* In some, the leaves were almost orbicular and obtuse, in others narrowly lanceolate or saliciform and acute, others had lobed and wavy edges, while others were quite entire. The plants were all growing within a few feet of each other, and the parent plants were also all under the same conditions of environment, and were all at no distant date from one parentage.

They were exhibited, said Mr. Meehan, for two purposes—first to show that what was commonly understood as environment was not a main factor in the origination of variation, and secondly to show that variation was independent also of mere conditions of growth or sexual peculiarities to which variation was sometimes referred. It was indeed true that young plants often had leaves varying from those on the older plants, and plants or branches bearing flowers of one sex would have characters varying from those of another sex, but these specimens were all fertile, and with young acorns. There was no possible ground for any suggestion as to different conditions in any sense, and the variations could be attributed only to an innate and wholly unknown power to vary, which science had so far been unable to reach.

Sonora Gum.—A substance called "Sonora gum," somewhat resembling a gum-resin in external appearance, and of hitherto uncertain origin, is found sparingly in commerce in California, and is used by brewers there in the manufacture of porter. Upon an investigation of the matter, Mr. F. Grazer finds that this so-called gum is the exudation from the branches of *Larrea Mexicana*, which was referred to under the title of Arizona shellac in a paper read by Professor Stillman at a meeting of the California Academy of Sciences several years ago. Mr. B. B. Redding, at the same meeting, referred to the plant as a source from which our commercial shellac could be obtained, stating that these lac-yielding plants, including *Acacia Greggii*, were as plentiful as the so-called sage-brush, from Southern Utah to New Mexico, and from the Colorado desert to Western Texas, the lac being most abundant around stations on the Mojave and Colorado deserts. The exudation, which takes place as the result of an insect's sting, could be easily collected by boiling the twigs in water, the gum (?) which rises to the top being skimmed off, strained, and dried on smooth stones, and hand-pressed into flakes, ready to make sealing wax or varnish. The plant requires a rainfall of three inches a year.

Formation of Gum in Trees.—Some time since, Sir James Paget created considerable interest by quoting in one of his lectures the results of an investigation by Dr. Beijerinck into the cause of the formation of gum in trees, which led him to believe that it was due to a pathological change brought about by the influence of a fungus (BULLETIN, xi., 33). Working quite independently, and in ignorance of Dr. Beijerinck's researches, Dr. Wiesner has since arrived at a sim-

ilar conclusion, except that he attributes the formation of gum to the action of an unformed ferment (*Monatshefte*, vi., 592). This ferment he considers to belong to the starch-converting or diastatic enzymes, but to differ from the ordinary members of this group in that, while it converts starch into dextrin, it produces no sugar that reduces Trommer's solution. The seat of the development of the gum ferment appears to be the granular protoplasmic matter of the parenchyma cells. From thence it attacks the cellulose of the cell walls, converting it into gum or mucilage, in the latter case disappearing itself from the finished product. The ferment probably converts any starch it may meet with into dextrin, though never into a reducing sugar; indeed it seems capable of arresting the action of diastase in this direction, when added to a solution of dextrin containing diastase.

A Square-Stemmed Bamboo.—The great predominance of the cylindrical form over all others in the trunks, branches and stems of plants renders an exception to the rule of considerable interest. The existence of a square-stemmed bamboo in China and Japan has several times been mentioned, but the assertions of travelers in regard to it have been received with some incredulity. There can be no doubt about the matter now, however. This variety of the bamboo is described and figured in a Japanese book, the *Sô Moku Kin Yô Sû* (Ornamental-leaved Trees and Shrubs), published at Kyota in 1829, and in the *Ju Moku Shiri-yaku* (Short Description of Trees) of Kinch, of Tokiyo. In 1880 some specimens of this bamboo were presented to the Kew Gardens, and it seems that it had been introduced into France some time before that. Nothing has been known of its presence in China until within a very recent period, say in 1882, when Mr. F. S. A. Bourne met with some specimens during the course of a voyage. It seems, from an extract from the *North China Herald* cited in *Nature*, that the Chinese hold the plant in great esteem, cultivate it as an ornament and put it to many uses. When young the stem is nearly cylindrical, but becomes square in time. It is, according to its age, manufactured into canes and pipe-stems. This peculiar variety of the bamboo is found in Chekiang, Tunnan and a few other regions. The Chinese attribute its form to supernatural power or to sorcery.

The Lechuguilla (*Agave heteracantha*, Zucc.), says Dr. Havard, is the most important of the soap or *amole* plants of Southwestern Texas and Northern Mexico. Iu the process employed for extracting the fibre, the parenchyma or pith squeezed out constitutes about 40 per cent. of the green leaf; when dried it is a white-yellowish, mucilaginous powder which possesses remarkable cleansing properties principally due to the presence of saponin. Its composition is very probably analogous to that of the root of *Yucca baccata*. Rubbed with water, it foams and lathers, answering the purpose of good soap without, owing to its freedom from alkali, its disadvantages. It imparts a smooth and satiny appearance to the skin, and is used successfully in removing stains from the most delicate fabrics. It tends rather to set than to displace colors, and articles likely to fade may be washed with it in safety. It is also an excellent wash for the scalp and hair, leaving the latter soft and glossy. If this powder could be compressed

into small cakes or tablets it would doubtless become an important article of trade.

Mexicans and Indians, after removing the prickles, pound the leaves into a pulp which they use instead of soap.

The Root of Baptisia tinctoria has recently been examined by Dr. von Schroeder (*Chem. Zeit.*, Oct. 14th), who finds therein, among other constituents, an alkaloid which he calls baptitoxine, and which has a poisonous action even in small doses. In frogs this alkaloid produces cessation of the respiration and then paralysis; in warm-blooded animals it causes a slowing of the respiration and an increase in the reflex irritability of the medulla.

Economic Uses of Opuntias.—Dr. Harvard, in *Proceedings of U. S. National Museum*, says of the prickly pears: "The joints, erroneously called 'leaves,' are readily eaten by cattle and sheep, for which they are an important article of food. It is well, as far as far as practicable, to make them undergo a preliminary scorching for a few moments, over a bright fire, to burn off the bristles and blunt the spines. I have seen cattle eating nopal leaves with great relish in the open field, although there was good green grama near by, seemingly indifferent to the many bristles and spines sticking to their noses. There are times when they prefer them to any other food. These leaves contain a large proportion of water and often save cattle and sheep from great suffering in dry seasons. If the time of drought be much prolonged, however, they lose much of their water by evaporation and become very thin; the pulp shrinks and the fibrous framework preponderates; in this state they are liable to cause sickness in animals feeding on them. During the three or four winter months, on the Lower Rio Grande, sheep often get no other food than nopal leaves. Every morning the shepherd cuts down, with his hand-ax or *machete*, the amount required for the day; as a rule he does not fire them. It is to be noted that as long as they feed on them the sheep require no drinking water.

"The nopal leaf is much used by Mexicans and frontiersmen as a poultice in bruises, ulcers and sores of all kinds. It is first slightly toasted to remove bristles and thorns, as well as to warm and soften the pulp; then it is split in two, or simply one of the surfaces shaved off, and the exposed pulp applied to the part. From the testimony of many intelligent people I am inclined to regard this as an excellent healing and gently stimulating application.

"It is also useful to clarify water. After being scorched it is mashed into a pulp, which, when thrown into water; like egg albumen, drags all impurities to the bottom.

"Again, this leaf may be prepared for food by boiling it in salt water; if afterwards cut up into a hash with eggs and chile colorado, it makes quite a savory dish."

Preserving Plants.—For the last three years, says Mr. P. Henning, certain fruits, flowers and other portions of plants have been preserved in perfect condition at the Berlin University (Botanical Museum) by means of a solution consisting of four parts of water and one part of alcohol saturated with salicylic acid.

Retirement of Sir J. D. Hooker.—After occupying for nearly

twenty years the position of director of the Royal Gardens, Kew, Sir Joseph Hooker now resigns that post. Though nearly seventy years of age, he seems as full of vigor and work as when, forty-five years ago, he joined Sir James Ross's Antarctic expedition as assistant surgeon in the *Erebus* and *Terror*. That voyage yielded a substantial contribution to botanical science. Not only as a botanist, but as a lecturer, he stands in the highest rank. His botanical work during his well-known wanderings in the Himalayas is of scarcely less scientific importance than that of the Antarctic regions, New Zealand and Tasmania; while it is difficult to conceive that his Himalayan Journals can ever be out of date, either for instruction or entertainment. Nor must the journey which he made in Morocco with Mr. John Ball be forgotten, and its substantial narrative, not to mention his run across America with that most genial of scientists, Prof. Asa Gray. No one probably did Darwin more service when working out his Origin of Species. As an eager fellow-worker and loyal assistant, few probably know the services Sir Joseph rendered to one who was the greatest of revolutionists, as well as the foremost of evolutionists. But it is as the director of Kew Gardens that Sir Joseph must be specially remembered at present. There he has held sway for thirty years—ten as his father's assistant and twenty as chief. It is mainly due to the Hookers that this royal domain has become the largest and finest garden in the world. The director of such an institution can have but little of that quiet and unworried leisure which is absolutely necessary for the best work in science, and it is this consideration, and not any feeling of failing faculties, that determined Sir Joseph to resign his trying post at the end of November.

The Papaw (*Carica papaya*).—All students of botany are well acquainted with the accounts given by travelers of the uses and wonderful properties of the fruit of *Carica papaya*, and most of us have read how the application of the juice of this fruit to a piece of tough meat will cause a disintegration of its fibres and consequently render it tender. Browne, in his Natural History of Jamaica, says that meat quickly becomes tender if it is washed in water to which some papaw juice has been added, and, if left in such water for ten minutes, it will drop from the spit while roasting, or separate into shreds while boiling. It is likewise said that in Barbadoes and other West India islands, it was once customary to feed pigs on the green fruit; but it was found that if these animals consumed any very large quantity without a sufficient proportion of other food, they not only suffered in health, but death actually followed in some cases from the intensity of the chemical action. Owing to the interest that has recently sprung up in Europe regarding the chemical action of this fruit, a large demand has risen for the dried juice and the commercial papain, both of which have lately been submitted to a new examination by Dr. S. H. C. Martin, who records his results in the *British Medical Journal* for July 25th.

Wurtz had described the ferment of the papaw as a proteid, soluble in distilled water, yet precipitated by nitric acid, but differing from a native albumen (as white of egg) in not being precipitated by boiling. In the material used by Dr. Martin in his former experi-

ments (commercial papain) he found two proteids, a globulin and a "peptone"; and he could not come to any conclusion as to which of these bodies was the ferment, or, to speak more correctly, which was associated with it.

In the present investigation he has attempted to settle this point. In the first place, the body called a "peptone" in a previous paper is not a true peptone, but is one of the bodies intermediate between globulins and peptones, first described by Meissner as a peptone, and called by Kuhne *hemialbumose*. This body agrees with peptone in certain reactions, and experiment shows that the ferment-action is associated with hemialbumose.

Of the results obtained in the investigation of the action of papain on the proteids in papaw-juice only a brief summary can be given. Of late years the former ideas of the nature and constitution of vegetable proteids have been entirely revolutionized, chiefly by the researches of Denis ('Mémoire sur le sang'), Weyl, Hoppe-Seyler, Vines, and others; so that now we may state that the two chief proteids found in plants are globulins and "peptones." Vines considers that there is no true peptone in the seeds of plants; he thinks it is a hemialbumose, and explains away Ritthausen's "legumin" and "conglutin," obtained from the seeds of *Leguminosæ*, referring the former to the class of hemialbumoses and the latter to a changed form of proteid produced by the action of alkalies and globulin. By pursuing the method first instituted by Denis, Dr. Martin obtained from papaw-juice proteid bodies whose reactions agree with those of the globulins and hemialbumoses, or rather albumoses, leaving the question as to whether they are anti- or hemia-forms for further consideration. The albumose precipitated by sodio-magnesium sulphate corresponds to Vines's hemialbumose. This albumose gives the same reactions as those of the body with which the ferment is so closely associated: it is the proteid in the juice most like a peptone. Dr. Martin found no true peptone.

The action of papain on these different constituents is peculiar, because in Dr. Martin's former experiments he has been able to discover no true peptone as a result of digestion; the body which is formed from the globulins is the albumose found in small quantities in the salt extract, the body which corresponds to Vines's hemialbumose.

Botanical Literature.

Thirty-eighth Annual Report on the New York State Museum of Natural History. Report of the Botanist, Chas. H. Peck. Albany, Weed, Parsons & Company. 1885.

From this Report we learn that one hundred and ninety-two species of plants were last year mounted and added to the State herbarium, and that of these (of which very many were fungi not before published) one hundred and sixteen were not previously represented therein. To these must be added two State species sent by correspondents, and new to the herbarium, making the total number one hundred and eighteen.

In continuation of a series of monographs of our Hymenomycetous or fleshy fungi, begun in the 33d Report and continued in the succeeding ones, Mr. Peck gives in the present instance on account of our State species of *Lactarius* (which are forty in number), and of *Pluteus* (nine in number).

The gratifying promptness with which the Report under consideration has been printed and published is due to a law passed in 1883, which provides that the scientific printing of the Museum shall hereafter be done "under the direct care of the Museum staff. Under this law the scientific papers prepared by the Museum staff will be issued, whenever ready, as Museum bulletins." This is as it should have been many years ago.

The Mycologic Flora of the Miami Valley, Ohio. By A. P. Morgan. (From *Journal* of the Cincinnati Society of Natural History.)

Observations on several Zoogloeæ and related Forms. By William Trelease, Sc.D. 8vo., pamph., pp. 24. (From *Studies* from the Biological Laboratory of the Johns Hopkins University.)

(1.) *The Spot-Disease of Strawberry Leaves.* (2.) *When the Leaves Appear and Fall.* By William Trelease. 8vo. pamph., pp. 20. (From Second Ann. Report Wisc. Agric. Exper. Station.)

Proceedings of the Torrey Club.—At the regular meeting of the club, Tuesday evening, November 10th, the President occupied the chair, and twenty-one persons were present.

Dr. Britton read some notes upon *Carya microcarpa* and a paper upon *Quercus Muhlenbergii*, Engelm, and *Q. prinoides*, Willd., in which he maintained that the eastern shrubby form of *Q. prinoides* was a well-marked variety of Dr. Engelmann's *Q. Muhlenbergii* (*Q. Castanea*, Muhl., *Q. Prinus*, L., var. *acuminata*, Mx.), and therefore proposed for it the name of *Q. Muhlenbergii*, Engelm., var. *humilis*.

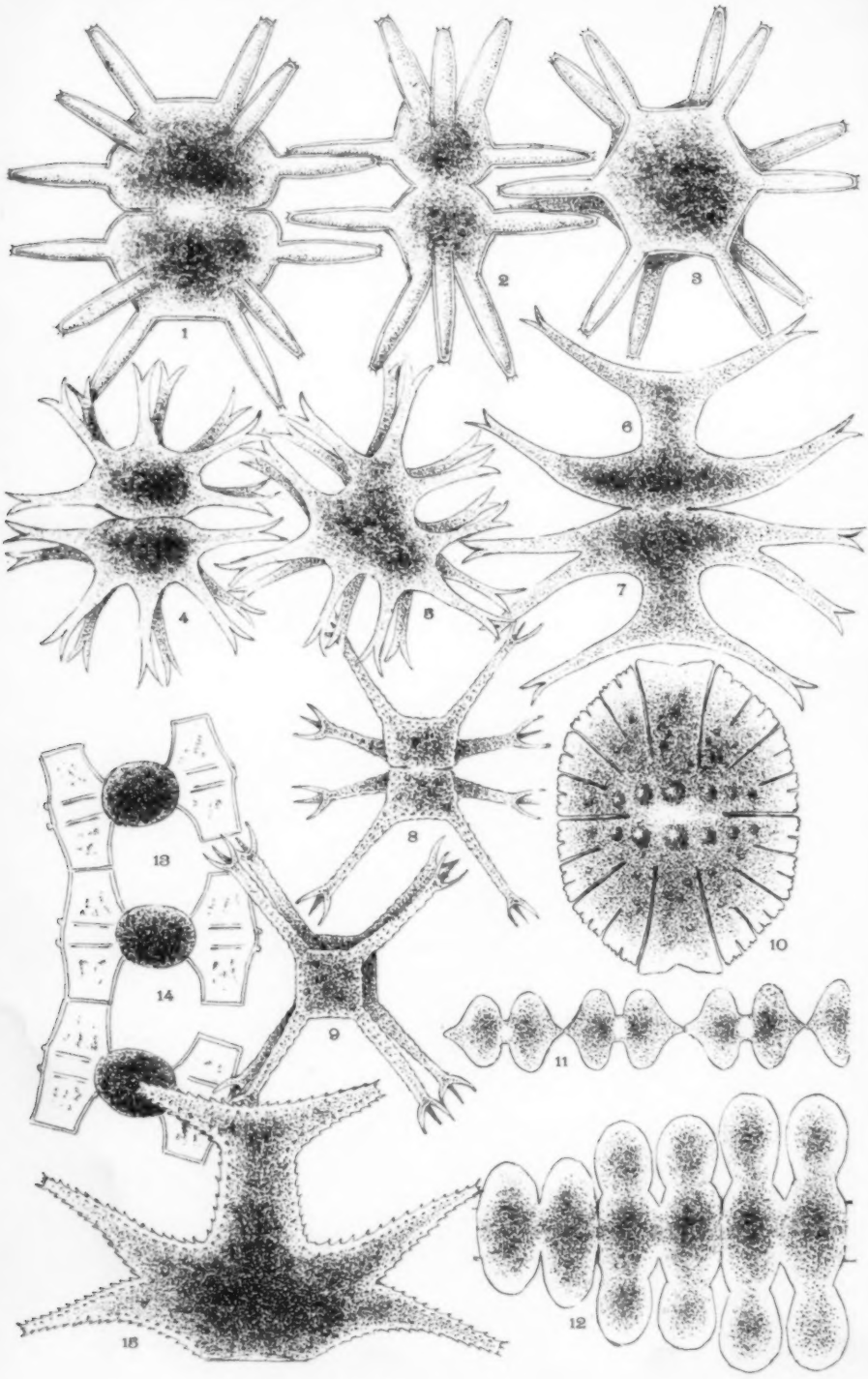
Mr. Hollick gave a brief account of the August flora of the vicinity of Tom's River, N. J., and exhibited specimens therefrom.

Dr. Newberry gave an interesting account of the fossil flora of the New Jersey cretaceous clays, and compared the forms that have been found with similar ones from the clays of Greenland and Aachen. Within the past few months upwards of a hundred and fifty species have been unearthed, these including about fifteen conifers, a dozen ferns, two or three cycads, several specimens of what appears to be a large composite flower-head, and a number of trees and shrubs, many of which are represented by living genera.

A white-flowered *Cnicus lanceolatus* was shown by Mrs. Britton, who also exhibited specimens of *Chrysanthemum Leucanthemum* in which the flower-heads appeared to be developed immediately from the root without the intervention of a stem—the latter, at least, if present, being too short to be visible.

Mr. Hollick showed an example of syncarpy in a cultivated cucurbit.

Two persons were elected active members.



NEW DESMIDS OF THE UNITED STATES.

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

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Fresh-Water Algæ. X.

By FRANCIS WOLLE.

(Plate LI.)

Two weeks spent in Florida, in the latter part of the month of March last, an occasional exploration nearer home and a few parcels from correspondents, suggested the following notes referring mainly to plants new to the United States. They are arranged in the order of proposed classification of our fresh-water algæ.

Ectocarpus, Lyngb. E. RIVULARIS, *n. sp.*—Tufts loose, 2–6 inches long, dark olive-green; filaments stout and firm, much branched; branches erect patent, mostly alternate, decompound; stems and branches tapering. Diameter of lower part of stems often 250μ, branches 100μ, more or less; articulations of stems and of branches rarely more than half as long as wide, often shorter; propagula rare, elliptic-oblong, acute, subsessile, constricted at base; older parts of stems corticulate, at first marked by longitudinal threads over the articulations, then by an irregular reticulation.

The *Ectocarpi* form a family of about fifteen species in our American marine waters, abundant along the Atlantic and Pacific coasts. The new species, *E. rivularis*, is claimed for fresh water. It has hitherto been found in only three known localities in Florida. The first discovery, made by myself, was in a fresh water marsh pool about two miles inland from Green Cove Spring, March, 1885. A month later, Rev. H. D. Kitchel found the same plant at Blue Springs on the St. John's River, more than two hundred miles from the sea. In a collection made by Capt. J. Donnell Smith in 1878, and sent to me, I discovered the same plant and made an illustration in my sketch book, but did not identify it then. The specimen came intermingled with other fresh-water algæ.

Among marine forms the plant is nearest *Ectocarpus Durkeei*, described by Harvey in his Nereis Boreali-Americana. More modern authors consider this form a mere variety of *E. granulosus*, Ag.; however this may be, it coincides with neither; besides affecting fresh water, it is much more rigid and robust, and the articulations of the stem are shorter, usually less than half the diameter.

Thorea, Bory. *T. ramosissima*, Bory.—Lake Osceola, Florida. The specimen found was small, but sufficient for identification.

Œdogonium, Link. *Œd. acrosporum*, D.B., var. LONGATUM, *n. var.*—Diameter of filament 7–8μ; much more slender than in the forms described, and the cells more elongated, averaging twice the usual length, 5–11 times longer than broad.

Œd. echinospermum, A. Br., var. SPERMOGONIO-MULTICELLULARE, *n. var.*—Gynandrosporous, oospores globose, echinulate, spines very slender, dense and long. Androsporangia 2–5-celled; dwarf males with spermogonia 8–10-celled. Fils. 25μ–30μ; oogon. 50μ; stipes of males 18μ; spermog. cells 15μ.

I collected finely developed specimens of this new variety in lakes at Winter Park, Florida, March, 1885.

ŒD. CATARACTUM, *n. sp.*—Idioandrosporous; oogonia often terminal, single or twin, obovate or subglobose, or broadly oval, pore in upper part; oospore globose or egg-shaped globose, nearly filling the oogonium; androsporangia 2–6-celled; dwarf males somewhat curved, seated on or sometimes below the supporting cell; spermogonia one-celled. Veg. cells 28μ–38μ long, 1.5–3μ diameter. Oogon. 55–60μ long, by 60–75μ. Oosp. 50–55μ long, by 50–60μ. Cell andro. 26–30μ long, by 10–15μ. Stip. dw. males 10μ long, by 65μ.

Rapid stream below High Falls, Dingman's Ferry, July, 1885.

Œd. punctato-striatum, D. By.—A good European species, for the first time here in lakes near Winter Park, Florida, March, 1885.

Cladophora, Ktz. *C. ægagropila*, Linn., var. THERMALIS, *n. var.*—Clusters attached, 1.5–2$^{cm.}$ in diameter, dark green; filaments rigid, much branched, more or less radiating from a common centre; branching lateral, erect patent, often enlarged towards the ends; articulations long, 10–20 diameters.

In manner of growth it has the appearance of *C. glomerata*, var. *pumila*, Bail., but the branching is lateral immediately below the apex, and not terminal as in that species. It has much in common also with sterile *Pithophora*. Comparing with European specimens of *ægagropila*, this is a fair representation, but it may be well to continue observations on fresh specimens in different seasons of the year for complete identification. The plant was found attached to the planked sides of the outlet of the large sulphur springs at Green Cove Spring, Florida, also attached to sticks of old wood in coves of bark at Silver Spring, Florida. The waters of both places are warm and sulphurous.

Dictyosphæreum, Naeg. D. HITCHCOCKII, *n. sp.*—Cells green, broadly oval, length about one and one-half time the diameter; others indicating division by transverse constriction in the middle; clustered in radiating branched series, held by slender, colorless, gelatinous threads; each cell having chlorophyll radiately gathered around a large central granule. The cells measure 12–13μ wide, 18–20μ long.

Frequent in Split Rock Pond, N. J.

Zygnema (Ag.) Ktz. Z. PURPUREA, *n. sp.*—Primarily yellowish green, but soon changing to a dark purple, articulation one diameter to more rarely two diameters; fruiting filaments more or less geniculate; zygospores spherical, cells not (or but slightly) swollen. Diameter of filaments 20μ to (rarely) 25μ.

This plant is common in ponds and lakes of New Jersey, floating in large masses often yards in extent, filaments often geniculately united, but never in perfect fruit. I was fortunate in finding the same plant last March in the Tocoi marshes near St. Augustine, Florida. Wide ditches alongside the railroad were literally covered

with a smooth, glistening, dark purple mantle. Here for the first time were discovered good fruiting specimens which determined the hitherto doubtful generic position of the plant. The chlorophyll is usually more or less centrally contracted in each cell. There is no evidence of twin nuclei, a fact which, with the color and the geniculate feature of the filaments, makes a distinct specific character.

Mesocarpus, Hassal. M. CRASSUS, *n. sp.*—Vegetative cells robust, measuring, with slight variation, 50μ in diameter, 5–10 times as long as wide; fruiting cells very nearly, or perfectly straight; zygospores smooth, spherical, 65μ in diameter.

Floating in extended, pale yellow-green masses on ponds near St. Augustine, Florida. In every way much larger than the largest of described species, and the articulations proportionately longer.

Staurospermum, Ktz. *S. gracillimum*, Ktz.

Lakes near Winter Park, Florida.

Bambusina, Ktz. *B. gracilescens*, Nord. (Plate LI., Figs. 13–14). This is described in my Desmids of the United States as a variety of *B. Brebissonii*. Whether viewed as such or as a distinct species, it was an interesting discovery to find fine fruiting specimens frequent in a pond near Winter Park, Florida.

Diameter of cells, 14μ; length, 23μ; apices, 8μ; zygospore, 15μ.

An observation made by Rev. H. D. Kitchel, and by myself, on gatherings from the same marsh pond is worthy of special note. The plant conjugates, not like one of the Desmidiaceæ, but, like one of the Zygnemaceæ, in longer or shorter series; often when the zygospores are nearly matured, the cells of one side separate and cause the other side to bend backward in a reversed, semi-circular form. We found the fruiting specimens in many stages of conjugation, first putting out separately narrow gelatinous connecting tubes, then these uniting and forming complete conjugation, next the chlorophyll passing out of the cells, flowing together in the tube, and gradually developing the zygospore, until fully matured.

Judging by these specimens, the correctness of the generic position of *Bambusina* may be questioned.

Sphærozosma, Corda. *S. pulchrum*, Bail., var. CONSTRICTUM, *n. var.* (Plate LI., Fig. 12).—Cells half as long as wide, with a decided constriction in each lobe between the axis and the apex. Diameter, 70–75μ.

Lake near Kissimme, Fla.

S. moniliforme, Lund. (Plate LI., Fig. 11).—Diameter 20μ; length of cell 40μ.

Lake near Kissimme, Fla.

Cosmarium, Corda. *C. Eloisianum*, Wolle. A species hitherto found only in Minnesota now turns up also in Splitrock Pond, New Jersey.

Micrasterias, Ag. *M. verrucosa*, Roy. (Plate LI., Fig. 10.)—In outline this species agrees with forms of *M. denticulata* (Bréb) Ralfs., but differs from these and all other described forms by the remarkable row of crenulated, circular or oval basal inflations crossing from side to side, larger towards the centre, gradually growing smaller towards the margins. The original, typical plant was found in Scot-

land. The first from this country was from a pond near Minneapolis, Minn., in collections made by Miss E. Butler.

M. ringens, Bail., var. SERRULATA, *n. var.* (Plate LI., Fig. 15.)—In size and form the same as the original type from Florida. Bailey describes it as "granular near the margins," but not as serrated. This new variety has the margins distinctly serrated. Found in large numbers in White Bear Lake, near Minneapolis, Minn., by Miss E. Butler. Diameter 115–130μ by 125–145μ.

M. furcata, Ag., var. SIMPLEX, *n. var.* (Plate LI., Figs. 6 and 7.)—Cell equal in length and breadth, two-lobed, end lobe exserted, its divisions spreading, producing a wide, shallow sinus; lateral lobes usually simple, sometimes divided into two, narrow, linear divergent sections, furcate at apices. Length and breadth 140–150μ.

A singularly variable species; of thirty-one specimens examined by Rev. H. D. Kitchel and myself, twenty were of normal form, as in the upper half of figures 6 and 7, no arms divided; five had all the lateral arms divided like the lower half of figures; one had two arms divided and one single; two had only one arm divided, and three had each two arms divided.

All from pond near Winter Park, Florida.

The second form mentioned, with all the lateral arms divided, is near the form described (Desmids United States, p. 111) as *M. pseudofurcata*, and needs further observations.

Staurastrum, Meyer. *St. Wolleanum*, Butler, var. MISSIMMENSE, *n. var.* (Plate LI., Figs. 1, 2 and 3 front, side and end views.)—A large smooth and beautiful form, fully one-half larger than the typical plant from Minnesota. The arms are similarly constructed and arranged, but, in proportion with the body, are much longer, nearly equal in length to the diameter of the body; apices not notched, but tipped with several small spines. Diameter, including the arms, 100–125μ.

Grassy shores of lake at Kissimme, Florida, March, 1885.

ST. TOKOPEKALIGENSE, *n. sp.* (Plate LI., Figs. 4–5).—Cell smooth, semicell in front view oval with gradiating arms; end view triangular, each angle drawn out into a smooth arm nearly as long as the diameter of the body; two similar arms on each side; all at nearly equal distances, and furcate at the apices. Diameter, including arms, 75μ.

This species occurs frequently in small coves of Lake Tokopekaliga, at Kissimme, Florida. It bears features in common with *St. furcatum*, Bréb., but is about twice the size, has more arms, and has them differently arranged; the description "one spine at each angle, with two accessory spines at the base," or "three spines at each angle," does not apply.

St. paradoxum, Meyen., var. OSCEOLENSE, *n. var.* (Plate LI., Figs. 8–9.)—This variety is near the typical form, but larger, and with the apices of the arms much more prominently forked. Spread of arms, 60–70μ.

St. longispinum, Bail.—This species, hitherto recognized by Prof. Bailey only, was found by Rev. H. D. Kitchel, the past summer in Florida, and by myself in New Jersey.

The front view was not described by Bailey and hence not men-

tioned in my Desmids of the United States, p. 145. The semicells are smooth, broadly elliptic, with the angles terminated by two, long, stout, subulate spines.

Lyngbyapapyrina, Kir. (*Phormidium papyraceum*, Ktz.)—Collected by W. A. Setchell, New Haven, Conn.

Oscillaria chalybea, Mertens. Florida.

Beggiaboa leptomitiformis, Trevis.—Collected by Miss G. Lewis, Clifton Springs, N. Y. April, 1885.

Spirulina tenuissima, Desmaz.—Frequent in sulphur springs, Green Cove Spring, Florida, and Clifton Springs, N. Y.

The Origin of Herbaria.*—At a meeting of the Botanical Society of Lyons, May 5th, 1885, Dr. Saint-Lager gave the results of the researches that he had made regarding the historical origin of herbaria. He had been led to this study by reading a work recently published by Messrs. Camus and Penzig upon the subject of a herbarium of the end of the sixteenth century discovered in the archives of Modena. In the first place, Dr. Saint-Lager stated that in the writings of the naturalists of antiquity no collection of plants that had been first dried and pressed and then united in volumes is ever spoken of. Yet it is certain that among the Greeks there were *botanologoi*, who, as the name indicates, devoted themselves to the gathering of plants. These persons were called also *rhizotomoi*, 'root-cutters,' and it was their business, particularly, to stock the shops of the *phytopolai*, or herb-dealers, called in Latin *herbarii*.

We know also that a botanical garden was established at Athens by Aristotle, and afterwards ceded to Theophrastus his pupil, and his successor at the Lyceum. Theophrastus bequeathed his garden, natural history museum and dwellings to his disciples. Pliny tells us that he often enjoyed visiting the garden wherein the venerable Antonius Castor cultivated all the plants of Italy, Greece, Asia Minor, Egypt and India. There was also a botanical garden near the celebrated School of Medicine of Alexandria. Later on, in the middle ages, the centre of phytological studies was transferred to Salerno, where Matthæus Silvaticus founded a garden which served as a model for all those that were established in several towns of Italy, Holland, Germany, England, Russia and France.

As botany, on account of the numerous applications formerly made of it in medicine, was, among the natural sciences, the one that had most adherents, it seems surprising at first sight that the art of preserving plants, dried and pressed, did not keep pace with that of cultivating them, and that Linnæus's aphorism that *omni botanico herbarium necessarium est* has not from all times been a fundamental clause in the cartulary of botanists. It is well to remark that the word *herbarium*, which might prove misleading, was used up to the middle of the sixteenth century to designate a botanical treatise accompanied with engravings opposite the text. Such is the *Herbarium* of Apuleius Platonicus and that of Giacomo Dondi, *Le Grani*

* From the *Bulletin trimestrial de la Société botanique* de Lyon, April–June, 1885, p. 61.

Herbier in French translated from Latin, the *Herbarium* of Brunfels, the *Herbario Nuovo* of Castore Durante, and several others of the same kind. The expression *hortus siccus*, 'dry garden,' by which was designated what we now call a herbarium, did not make its appearance until towards the end of the sixteenth century, and, on another hand, the most ancient herbaria preserved up to our day are those of the Lyonais surgeon Gréault (1558), in the Paris Museum, of Aldrovandi (1560–68), in 16 volumes, at Bologna, of Rauwolf (1573–75), at Leyden, of an unknown botanist, in the archives of Modena, and of Gaspard Bauhin (1576–1623), at Basel.

Dr. Saint-Lager gave a description, from Messrs. Camus and Penzig, of the Modena herbarium, and, from Mr. Caruel, of the much more extensive one of Cæsalpinus, and he expressed his regrets that so little care had been taken of the herbaria formed by Lyonais botanists. No trace of Daléchamps's collections remains, and there are but a few fragments of those of Goiffon, who had the honor of being Jussieu's master. The herbarium of Claret de la Tourrette has, with the exception of the lichens, been distributed through the general herbarium of the Conservatory. No one has ever had the curiosity to visit the herbarium of Abbot Rozier. Finally, there has recently been found at the Conservatory of Botany a herbarium which was formed in 1699 by an apothecary named René Marmion, and which, on account of its antiquity, should have merited a better fate than that of being devoured by parasites.

It now remains to examine a question to which no one has ever paid any attention, and that is why herbaria were not formed before the sixteenth century? Assuredly it was not because the invention required a great effort of genius. Even children, without being taught, know how to form little herbaria by inserting flowers between the pages of a book during their walks in the fields. This word *book* contains the answer to the question proposed. The ancients did not prepare herbaria because they did not know the art of uniting into book-form sheets of that admirable material, paper, which, although very thin, is relatively quite stiff. They wrote upon papyrus, or upon sheets of parchment which they *rolled* into a volume (*volumen*, from *volvere*). Moreover, they would never have ventured to employ papyrus, a costly material, nor even parchment, for so vulgar a purpose.

In the twelfth century of our era the manufacture of paper from silk (*charta bombycina*) and from cotton (*charta cotonea*) was begun in Europe, according to processes long understood by the Chinese; but it was not till the fourteenth century that it was known how to make paper out of linen and hempen rags. And then, as all the operations were performed by hand, paper was quite a dear product. When, about the middle of the fifteenth century, the art of printing was invented, paper manufacturers taxed their ingenuity to reduce the cost of labor, and constructed machines adapted for comminuting rags and spreading the pulp in the form of endless sheets. Now it is worthy of remark that the appearance of herbaria coincides with the mechanical improvements by means of which it became possible to manufacture paper at a low price. Such economic result once

obtained, the idea of preserving dried plants must have occurred to several botanists at the same time; and it seems to be useless to discuss at length the question as to whether the inventor of the forming of herbaria was Luca Ghini, as maintained by Meyer in his Geschichte der Botanik, or the Englishman Falconer, as thought by Messrs. Camus and Penzig. In fact, said Dr. Saint-Lager, the Lyonais surgeon Gréault formed a herbarium at the same period as did Ghini and Falconer, and without having been in communication with them. It is probable that other botanists likewise have simultaneously carried out the very legitimate desire of preserving in their library those plants which they had taken so much pleasure in gathering in a living state. The difficulty did not consist in conceiving of the idea of collecting dried and pressed plants together into a volume, for that is child's-play, but rather in finding a convenient and cheap mounting material.

Botanical Notes.

Red Snow.—At a recent meeting of the Biological Society of Washington, Mr. Romyn Hitchcock, of the National Museum, read a paper on Red Snow, and exhibited through the microscope specimens of the brilliant, minute, crimson globules which give color to the snow, and about the character of which there has been considerable difference of opinion among naturalists. Mr. Hitchcock remarked that the red snow that attracted much attention from scientific gentlemen when it was brought home from the Arctic regions by Capt. Ross, in the year 1818, was by no means unknown before that time. De Saussure, as early as 1760, observed it on Mount Breven, in Switzerland, and since then many others have noticed it in the Alps and Pyrenees, and it seems to occur frequently in all parts of the world. Particular interest, however, was manifested in the material brought home by Capt. Ross, and several botanists secured specimens for examination, and, among these, Mr. Francis Bauer, who thought the plant a *Uredo*, and named it *U. nivalis*. Baron Wrangel regarded the plant as a lichen, and gave it the name of *Lepraria Kermesina*.

In the latest literature of algæ the plant is classed as a *Chlamydococcus*. Until the method of propagation of this plant is more satisfactorily established, Mr. Hitchcock thinks it will be impossible to fix its systematic position. It is not improbable that in its actively vegetating condition the plant is green. This is indicated by the observations of early discoverers.

A specimen of the red snow collected by Dr. Kane from the crimson cliffs of Beverley is in the National Museum, but is now thoroughly dry.

A specimen sent by Mr. Alexander McDougall was received in January of this year from Poverty Gulch, Col.

Mr. Hitchcock made a few observations on this and attempted to cultivate some of the cells, but without success. The cells were of a bright red color, sometimes apparently quite naked, but frequently enclosed singly or three or more together, in a colorless, shrivelled envelope.

The contents of perfect and fresh cells appeared to be quite clear and transparent, with occasionally a well-defined sort of vesicle of a deeper color than the rest. When the endochrome was pressed out from the cells into the surrounding water it contracted into spherical, oil-like masses. The surrounding envelope was quite hard, tough and resisting.

Identification of Species by Cell-wall Markings.—Messrs. Lawrence and Raddin, of Evanston, Ill., have been making a study of the markings of the cell-walls of various exogenous trees with the object of ascertaining whether it is possible to distinguish species by this means. The results of their observations are published in the November number of the *Microscope*.

The conclusion that they reach is that species cannot be distinguished by this means, and they further observe that the same species collected in different localities presented differences that were oftentimes very great. They even assert that species of the same genus frequently bear no relation to each other in this respect, and that the markings on the cells of *Quercus rubra* sometimes so closely resemble those of *Pinus Strobus* that there is danger of confounding the woods of these two trees.

Vegetative Organs of Monotropa.—In studying the structure of *Monotropa Hypopitys*, Mr. F. Kamienski finds the root of this plant "to be covered externally by the mycelium of a fungus, which branches abundantly and forms a pseudoparenchymatous envelope, often two or three times the thickness of the epidermis itself, being especially well developed at the apex of the root. It is entirely superficial, not penetrating the living cells, though occasionally between the epidermal cells. The species of this fungus Mr. Kamienski was unable to determine, but considers it to be probably identical with that found on the roots of conifers and other trees. With regard to the mode of nutrition of *Monotropa*, Mr. Kamienski decides that it is not a parasite. The most careful examination failed to detect any haustoria or other parasitic union of the root with any "host." He regards it as deriving its nutriment from the soil through the medium of the fungus-mycelium by which the roots are invested; the only parts of the root which are in actual contact with the soil are composed of lifeless cells with no power of deriving nutriment from it. The connection of the fungus with the root of the *Monotropa* is not one of parasitism, but of true symbiosis, each of the two organisms deriving support and nutriment from the other.—*Journ. Roy. Microscop. Soc.*

The New Director of Kew Gardens —We supplement the statement made in our last number as to the retirement of Sir Joseph D. Hooker from the post of Director of the Royal Gardens at Kew by the announcement that Mr. W. T. Thiselton Dyer, who for some time past has ably performed the duties of Assistant Director, has been nominated to succeed him.

The de Candolle Prize.—The Society of Physics and Natural History of Geneva offers a prize of 500 francs for the best original monograph of any family or class of plants. The prize was instituted by Mr. A. P. de Candolle. The manuscripts may be in Latin, French,

German, English, or Italian, and must reach the president of the society before the first of October, 1889. The members of the society are not allowed to compete.

New American Desmids.—In a paper read before the Royal Microscopical Society, Nov. 11th (*Journal* of the Society, pp. 933–40) Mr. W. B. Turner describes a number of desmids, of which the following new species and varieties are North American: *Genicularia Americana* (Minn.), *Leptozosma* catenula* (N. J.), *Onychonema Nordstedtiana*, *Cosmarium gemmatum* (Minn.), *C. rostratum* (Minn.), *Euastrum Floridanum* (Fla.), *E. pseudelegans*, *E. coronatum* (Minn.), *Micrasterias furcata*, var. *decurta* (N. Y.), *M. mamillata* (Pa.), *M. Americana*, var. *spinosa* (Nova Scotia), *M. denticulata*, var. *Minnesotensis* (Minn.), *M. papillifera*, var. *Novæ Scoticæ* (N. S.), *Arthrodesmus incus*, var. *Americana* (Pa.), *Xanthidium armatum*, vars. *Wolleanum* and *Americanum*, (N. J.), *Staurastrum gladiosum* (N. J.), *S. Pringsheimii*, var. *duplo-majus*, (N. S.), *Docidium occidentale*, and *Gonatozygon sex-spiniferum* (Minn.). The descriptions of the above are accompanied with two plates of figures.

The following are given as new to North America: *Cosmarium Cordanum*, Bréb. (N. S.), *Staurastrum dejectum*, Bréb., var. *Sudeticum*, Kirch. (Minn.), and *Penium spirostriolatum*, Barker (Minn.)

The Fruit of Opuntia.—At the meeting of the Philadelphia Academy of Natural Sciences, August 11th, Mr. Thomas Meehan exhibited a series of specimens of an unknown species of *Opuntia* closely allied to *O. Brasiliensis* and showing a gradual change from the joint or frond to the fruit. In one case there was the thin orbicular frond, then a frond with a slight rounding and tapering at the base, then one somewhat resembling a fruit, but very much compressed, and with an abortive flower-bud having a scar at the apex, then another with a perfect flower, but very much elongated and fluted, but with a perfect flower, though small, and lastly the frond reduced to an inch in length, pyriform, and with the perfect large yellow flower. He remarked that it could not be called a novel point to make that the fruit of a *Cactus* was simply a metamorphosed frond, or joint as the section is commonly called, and that the petals were the usually very much suppressed leaves, but it might serve a good purpose to place on record this excellent illustration of the fact.

A deep-water Moss.—Fishermen who capture the char off Yvoire Point on the southern shore of Lake Leman, says *La Nature*, often bring up in their nets fragments of rocks upon which is frequently found growing a moss of a beautiful green color. These stones, according to the distinguished naturalist Mr. J. B. Schnetzler, and to Prof. Bocion of the Industrial School of Lausanne, come from a depth of 200 feet. No stream of water enters the lake in this region, and the rock, with adhering moss, is found at a great distance from the shore. No moss has hitherto been found living at so great a depth. The fact is the more striking in that the cells of the species under

* LEPTOZOSMA, *n. gen.*—Filamentous, long, cateniform; not twisted or but slightly so. Joints united by a strongly marked suture; cells attenuate at the ends towards the suture. Near to *Bambusina*, but differing in the suture.

consideration are filled with chlorophyll, a coloring matter which, save rare exceptions, can be developed only under the influence of light of a certain intensity.

Botanical Literature.

Manual of the Botany (Phænogamia and Pteridophyta) of the Rocky Mountain Regions, from New Mexico to the British Boundary. By John M. Coulter, Ph.D. Ivison, Blakeman, Taylor & Co.: New York and Chicago. 1885.

This book will be gladly welcomed by western botanists, as well as by those of their eastern confreres who have had occasion to identify western plants, and who know by experience how difficult it often is to obtain access to descriptions. The range of the work includes Colorado, Wyoming, Montana, Western Dakota, Western Nebraska and Western Kansas, the eastern boundary being very nearly represented by the hundredth meridian. The greater portion of contiguous floras is also described, so that "the western part of the Indian Territory, Northwestern Texas, Northern New Mexico and Arizona, and Eastern Utah and Idaho may be included for all except their own peculiar plants." This is a very wide range and embraces one of three regions west of the Mississippi Valley prairie country that possess well defined floras, the others being that of the Pacific slope, which is provided for in the Botany of California, and that which extends from the Great Basin to Arizona, New Mexico, Western Texas, and southward into Mexico, and which is found described partly in Mr. Watson's Botany of the Fortieth Parallel and partly in Dr. Rothrock's Botany of the Wheeler Survey.

As a general thing, Prof. Coulter follows the sequence of orders adopted by Bentham and Hooker, but he has transferred Gymnosperms to the end of Phænogams, and has subordinated Monocotyledons and Dicotyledons to Angiosperms, as this, he remarks, better expresses relationships that have long been recognized. The old term "Cryptogam" has been discarded for that of Pteridophyta, and the classes and orders have been arranged under this series in that sequence which the author thinks best expresses relationships.

The descriptions of adventive plants are in all cases printed in smaller type and placed at the bottom of the page.

In size, typography and general make up, the book is uniform with Dr. Gray's Manual. In view of the want that has long existed for a concise account of the flora of the Rocky Mountain region, in a convenient form for reference, we bespeak for Prof. Coulter's work a large sale.

Les Procédés operatoires en Histologie Végétale; Cuide pour les Etudes de Microchimie. Par Louis Olivier. Paris: Savy. 1855.

In this volume, Mr. Olivier has brought together in systematic order, from various scattered papers, descriptions of the most approved methods of preparing microchemical reagents, and the mode of applying them to the study of plants. After pointing out how great a light is shed upon the minute anatomy of the tissues by the microchemical method, the author discusses the form, the structure, the contractility,

and the various properties of protoplasm; the general structure and physiological rôle of the cellular nucleus; the degree of complication of the ternary membranes; the nature of the substances that exist in the cells, in solution or in an amorphous or crystalline state; and then proceeds to give the methods of examining each organ, tissue, or other plant element.

This book will prove a valuable addition to the libraries of those who are interested in the study of vegetable histology, although students in this country are perhaps well enough provided for in this respect in Prof. Trelease's translation of Poulsen's work on the same subject, published by S. E. Cassino & Co. last year.

Talks Afield about Plants and the Science of Plants. By L. H. Bailey, Jr. Boston: Houghton, Mifflin & Co., 1885. 12mo., pp. 168.

This is a pleasantly written little volume, well adapted to fulfil the mission for which its author intended it, *i. e.*, to give the non-botanical public "a popular account of some of the leading and external features of common plants." Some of the topics treated of are the following: the flower; the stem; the classification of flowering plants; the rose family; the composite family; a peep at the inside; the sexes of plants; cross-fertilization; hidden flowers; the arrangement of leaves; carnivorous plants; a talk about roots; how plants are named, etc. The work is profusely illustrated and handsomely printed, and can be recommended as a safe guide to those who desire to obtain an intelligent idea of plant structure and classification, and who yet do not wish to take up the study of botany as a science.

Report on the Flora of Western and Southern Texas. By Dr. V. Havard, U. S. A. 8vo., pamph., pp. 85.

This very valuable report is based upon the observations and collections made by Dr. Havard during the last five years at various posts at which he has been stationed, and also, "and chiefly, while on duty with the expeditions for the exploration of Western Texas, under the command of Major W. K. Livermore, . . . in the summer and fall of 1881 and 1883." In the first part, the author describes, in a general way, the vegetation of Western and Southern Texas, and sketches the topographical features of the country. The second part is devoted to economic notes upon such plants of the Texano-Mexican flora as are known to have useful or baneful properties, or to be of value to the industries.

Les Champignons supérieurs. Physiologie. Organographie. Classification. Détermination du Genre; avec un Vocabulaire des Termes techniques. Par L. Forquignon. Paris: Octave Doin. 1885.

This is a little duodecimo volume dedicated to beginners in the study of the higher fungi, and gives excellent descriptions of some of the principal species of Agaricini, Polyporei, Hydnei, Thelephoræ, Clavariæ, etc., found in France. The descriptions are followed by a brief account of some exotic fungi; by a bibliographical index, which, although not exhaustive, is sufficiently complete in its enumeration of the most interesting works on mycology; and by a vocabulary in which the Latin words are explained. Finally, 105 excellent figures,

due to Dr. Quelet, add to the value of the book, and give a correct idea of all the genera and of the principal species.

Henry Shaw School of Botany. Inaugural Exercises in Memorial Hall, St. Louis Museum of Fine Arts, Nov. 6th, 1885. 8vo. pamph., pp., 24.

Catalogue of the Phænogamous and Vascular Cryptogamous Plants of North America (exclusive of Mexico.) By J. H. Oyster. 8vo, pp. 112, Paola, Kansas. 1885.

Sketch of the Botanical Work of the Rev. Moses A. Curtis, A.M., D.D., F.A.A.S. By Thomas F. Wood. Raleigh: Edwards, Broughton & Co. 1885. 8vo, pamph., pp. 31; with steel plate portrait of the subject of the memoir.

Proceedings of the Torrey Club.—The regular meeting of the Club was held at Columbia College, Tuesday evening, Dec. 8th. In the absence of the President, Mr. Braman occupied the chair.

The committee appointed at the last meeting to extend to Dr. Gray the Club's congratulations on the completion of his seventy-fifth birthday submitted the following correspondence:

(RESOLUTIONS.)

Resolved: That the Torrey Botanical Club of New York sends its greetings to Dr. Asa Gray on the attainment of his seventy-fifth birthday, and its congratulations that it finds him in the enjoyment of health, the full possession of all his great powers and undiminished enthusiasm in the science to which he has devoted his life.

Resolved: That we tender to Dr. Gray our gratitude for the splendid contributions he has made to American botany, and our heartfelt wishes that many years of activity and happiness may yet be added to his already long and useful life.

J. S. NEWBERRY, M.D.,
ADDISON BROWN,
E. G. K. BRITTON,
} *Committee.*

(REPLY.)

HERBARIUM OF HARVARD UNIVERSITY,
BOTANIC GARDEN, CAMBRIDGE, MASS.
November 20th, 1885.

To Arthur Hollick, Secretary, and Prof. J. S. Newberry, Addison Brown, Esq., Mrs. E. G. K. Britton, Committee of the Torrey Botanical Club:

Let me return my sincere thanks for the honor you have paid me and the pleasure you have given me by the congratulations which the Torrey Club has sent through you, on the occasion of my seventy-fifth birthday, with which I have been deeply touched and gratified.

With best wishes to you all personally, and for the prosperity of the Club which has so honored and venerated a name, I remain

Sincerely yours,
ASA GRAY.

Mr. O. R. Willis read a number of reminiscences of some of our earlier botanists—Torrey, Rafinesque, Short and others.

Mr. Britton showed a specimen from the Torrey herbarium labeled *Geranium*, simply, collected by Dr. Denslow in 1867 on the Kingsbridge road, and which proves to be *G. Sibiricum*, L.

Mrs. Britton remarked upon some additions to the flora of Westchester County, and exhibited specimens of double-flowered *Viola pubescens* from Pelham Manor.

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